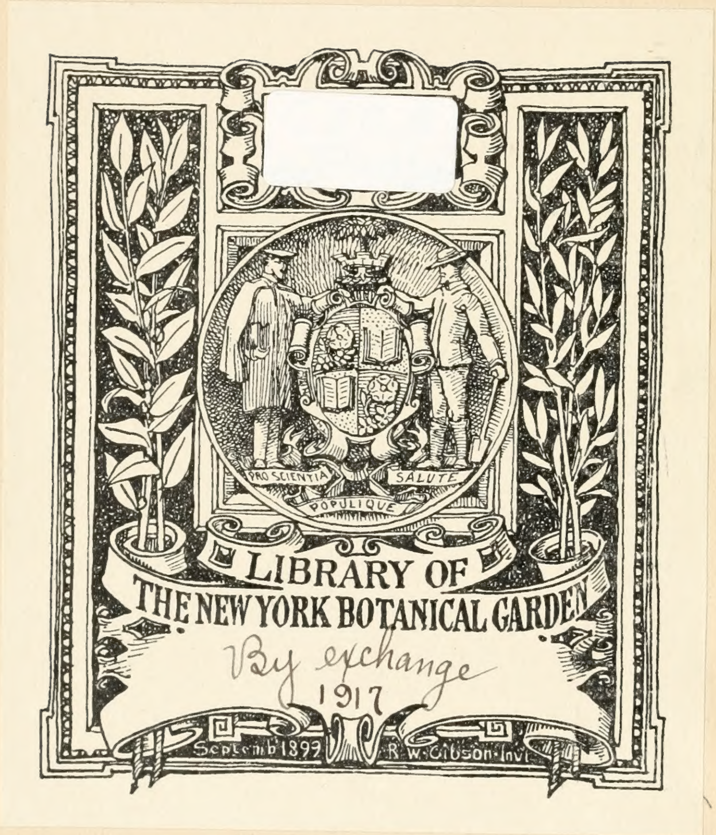

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PENNSYLVANIA
DEPARTMENT OF AGRICULTURE

OFFICIAL LIST, 1915

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Washington, Washington County.

M. D. Lichliter, Chief Clerk,
Bellevue, Allegheny County.

E. C. FIRST, Clerk, Farmers' Institute Bureau,
Harrisburg.

BERTHA H. SIEBER, Stenographer,
Harrisburg.

J. FRANK ZORTMAN, Messenger,
Etters, York County.

JAMES FOUST, Dairy and Food Commissioner,
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MAY V. RHONE, Clerk, Dairy and Food Bureau,
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WILLIAM R. SWARTZ, Messenger, Dairy and Food Bureau,
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H. A. SURFACE, Economic Zoologist,
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P. T. BARNES, Assistant Economic Zoologist,
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V. A. E. DAECKE, Clerk, Bureau of Economic Zoology,
Philadelphia.

KATHRYN P. FIRST, Stenographer, Bureau of Economic Zoology,
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J. C. SIMMONS, Messenger, Bureau of Economic Zoology,
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C. J. MARSHALL, State Veterinarian,
Philadelphia.

T. E. MUNCE, Deputy State Veterinarian,
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RUSSEL T. WHITSON, Clerk to State Veterinarian,
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ADELINE V. GREATHEAD, Stenographer to State Veterinarian,
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L. H. WIBLE, Statistician,
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J. HERBERT THOMAS, Chief, Bureau of Disbursements,
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W. R. DOUGLASS, Publicity Director,
Harrisburg.

H. E. KLUGH, Clerk of Fertilizer Control,
Harrisburg.

TWENTY-FIRST ANNUAL REPORT

OF THE

SECRETARY OF AGRICULTURE

To His Excellency, Martin G. Brumbaugh, Governor of Pennsylvania:

Sir: In compliance with the act of Assembly, creating a Department of Agriculture of Pennsylvania, I have the honor herewith to submit my report of said Department for the year 1915.

Agriculture is the oldest industry and farming the greatest science in the world. Yet, too frequently, have the tillers of the soil lost sight of the scientific feature of farming, thereby depleting their lands through worn-out methods that should have long since been eliminated. Pennsylvania agriculture in the nineteenth century, for more than forty years underwent great stress and trial in competing with the newer states in the Great West. It had been the leading state in agriculture and led the procession of the Commonwealths of the Union. But Pennsylvania lost its distinction through causes that grew out of the great westward movement that took from the State tens of thousands of its best and wide-awake farmers who were drawn to the broad prairies of what are now Indiana, Illinois, Iowa, Kansas and Nebraska. There, the rich soils recompensed the tiller with great crops, produced with less labor, which were moved eastward and entered into competition with the eastern producer, who, with more labor and greater cost could not compete, hence the farming industry, on account of low values, languished.

Conditions, however, have changed. A too constant tilling of their soil weakened the productive power of the lands of the West; also the home consumption became greater, so that the competition in the East was not so marked, and agriculture in Pennsylvania took on new life. The crisis is past; and under new conditions, with a wider knowledge of the science of farming, the eastern farmer is readjusting himself to meet the twentieth century problems. One of these problems is

THE TREND TOWARD THE CITY

Possibly the greatest problem that confronts the American farmer is the drift from the farms to the cities and industrial centers. And for half a century this drift has been going on, increasing rapidly in later years. Warnings have been sounded from time to time, but they have gone unheeded. In 1880 thirty people in every 100 lived in the city; today fifty out of every 100 live in these great centers of population. Of this number, one out of every twenty are from the farms. Hence only one-half of our population are producers and the other half consumers; whereas, in 1880 the producers outnumbered the consumers three to one. So far as Pennsylvania is concerned, in 1891, 51 per cent. of the people were rural; today from 35 to 38 per cent. of the total population of our State is rural. It is estimated at the present time that 11 per cent. of our population are on farms. Hence the need of increased interest in agriculture is apparent. The causes for this drift is lack of conveniences, attractions and social enjoyment in the country that are found in the cities. If these causes were removed, the tide would turn "back to the farm." It is the inequality of country life that has sent our young men to the cities where many have failed or have fallen through temptations that are so marked in crowded industrial centers.

Another problem confronting the farmer is

THE LACK OF GOOD ROADS

One of the greatest items of expense to the farmer is that of transporting his produce to the markets, or to the line of railroads or steamboat landings. The Bureau of Public Roads estimates that more than 350,000,000 tons are hauled over our public roads each year with an average of an eight mile haul, and at an average cost of twenty-three cents per ton per mile. The railroads handle the same produce on hauls of thirty miles and less at two cents per ton per mile, and where the haul is 150 miles or over it is made at a cost of *one-half cent per ton per mile.*

The same authority states that it would not cost more than thirteen cents per ton per mile if all the roads of our country were such as they should be, thereby saving to the people *one quarter of a billion of dollars every year.* The Office of Public Roads is the authority for the statement that in the United States only 247,490 miles of the 2,273,131 miles of roads, or 10.9 per cent., are surfaced, while all the rest are *mud roads.* A rather humiliating showing. It is stated that of all the civilized countries on the globe, America has the poorest roads. In natural wealth, in agricultural products, in the manufacture of steel and iron and in the number of miles of railroads the United States stands first; but in roads stands last.

France, with her system of roads, saves to the agriculturist two-thirds of the expense of America in transporting farm products to the line of railroad or steam navigation. The lowest cost of hauling the produce from farm to market is in Hanover, the average running being about four and one-half cents per long ton per mile; in Italy, nine cents; in France, eleven and one-half cents; in England, twelve cents. Thus in the United States the farmer pays from forty to ninety-five per cent. more to carry his products from the farm to the nearest railroad station or river landing than the farmer in Europe.

Here is presented one of the causes which drives farmers' boys and girls to the overcrowded cities. If the State had good roads it would stop this drift. Make it possible in inclement weather as well as in good weather for the boys and girls to go out on pleasure bent or on business, they will prefer to remain on the farm amid its healthful and moral surroundings.

"BACK TO THE LAND" SLOGAN

The battle-cry, "Back to the land" is the slogan of the hour. It is told on the platform, preached from the pulpit, is the subject of editorials and everywhere is heard the refrain, "back to the land." Much of this cry are mere platitudes; meaningless. If this great country is in earnest in shouting "back to the land," it will give the young people a square deal. Improve the surroundings of the farm home; construct good roads and thus induce the young men by attractions, to leave the thronging multitude of our cities and return to the home of their fathers. The State should discourage the rental system by adopting some method of credit system whereby the tenant farmer can purchase from the owner who has retired to the city a farm, and thereby build up an interested farming constituency that will give the land better tillage and thus insure better and larger production. There should be a system of marketing the products of the farms without the presence of the middleman that will bring more money to the producer and, through the dealer, cheaper prices to the consumer.

Co-operation should be the watchword of the hour. Let organizations co-operate for mutual help and protection and thus bring in a new era in the farm community. Make it possible for the farmer to carry on his farm by supplying him with money.

SCARCITY OF FARM LABOR

Could the problems, noted above, be solved and this trend to the city be stopped, one of the greatest difficulties now confronting the farmer, scarcity of labor, would be removed. From all sections of the State there comes to the Department appeals for farm hands. While the wages for farm labor has, to some extent, been increased, the supply cannot be met. The abnormal development of our chief resources has brought about this scarcity. Our great deposits of coal and iron are being taken from Nature's storehouse with such prodigality, amounting to wastefulness, that a great army of men, both native and foreign born are required to carry on these industries. Some of our philanthropists have endeavored to meet this difficulty of scarcity of farm hands by inducing immigrants, coming from the farming sections of Southern Europe, to settle in the country and take their places on the farm.

Laborers sent free of cost to the farming sections soon tire of country life and in a week or two leave and turn to the cities to engage either in mill work or in the uncertain occupations of peanut vendors or similar lines.

Our own State has 51,165 tenant farmers or about one to every fourth farm, and about 50,000 farms are mortgaged. The greatest number of tenant farmers are found in the Southern States, the highest being Texas with 219,575, with Pennsylvania standing eighteenth. With the exception of two Western states, the Keystone State has more tenant farmers than any other state north of Mason's and Dixon's Line.

THE CONCENTRATION OF WEALTH

Has some bearing on the farm question and affects the farmers, not only in depriving them of the young men who are drawn into these great industrial marts to supply the immense market for clerks, etc., but by bringing about a concentration of land ownership and increased tenant farming. It is clear, from observation and the study of political economy, that the number of poor and destitute people are increasing in this country and that the number of private fortunes are growing larger. The conditions that affected many countries of Europe, especially England, have been transplanted to this country and for a quarter of a century this concentration of wealth has gone on until we have outstripped every nation on the globe. Statisticians have declared, that as far back as 1890, one per cent. of the people owned over one-half the nation's wealth. In 1900 it was estimated that 440 corporations owned $20,000,000,000 of the $90,000,000,000 that represented the wealth of this country. And such is this money-mad trend and mania for merging gigantic interests, that today a less number of corporations possess a greater amount of the money of this land than fifteen years ago. And should this continue, according to one of the greatest corporation lawyers and political economists of this country, in 1950 *fifty thousand persons will substantially own the United States.*

This alarming tendency of the times, more or less, affects the farming industry of the United States by the concentration of land ownership and the increase of farm tenantry. In some of the states one-half or more of the farms are operated by tenants. Laws that will correct some of the abuses of the tenant system on one hand and increase the efficiency of same system on the other hand will, to a great extent, give an uplift to agriculture.

FACING THE SUNRISE

In the face of all the difficulties confronting agricultural development in Pennsylvania, a few of which have been briefly enumerated, as a State, a better day is dawning. On every hand there are evidences of this uplift. The large number of our young men attending agricultural schools, fitting themselves for agricultural activity, is a gratifying evidence of this trend toward better things. The wonderful increase in the demand for agricultural literature and the increasing number of farm journals published indicates the drift of the thought of the people. The increasing demand for more farmers' institutes and for the advice and helpful suggestions of the farm advisers and the large attendance at farmers' meetings demonstrates the fact that there has come to the farmers of the State a great awakening in all lines of agriculture. In short, agriculture today is more talked about, written about and thought of than ever in the history of the past, which augers well for a greater future in this the oldest industry on the globe. We are facing the sunrise of a brighter day in the people's industry—the great life-preserving occupation of the world without which all other industries would fail.

Pennsylvania is essentially an industrial state. Three-sevenths of all the iron and steel in the nation is manufactured in the old Keystone State, while from fifty-two to fifty-four per cent. of all the coal in the United States is mined from our almost inexhaustible storehouse of this valuable mineral. In other industries, such as oil, gas, limestone, iron ore, cement, rock and slate, Pennsylvania ranks well with other states of the Union; and to such an extent has the attention of the people been turned to these mighty industries, that in the minds of many, agriculture is looked upon as an after consideration and there is a failure to realize its intrinsic importance and magnitude.

CEREALS

The statistics shown in detail in the report of the Bureau of Statistics, incorporated as a part of this Annual Report, indicates the distinguished position Pennsylvania occupies among her sister states in the importance and value of her agriculture. The values of the five principal cereals grown in the State during 1915 were more than the national average for these crops. And so great was this average increase that it has attracted wide-spread attention. Pennsylvania farmers produced, in 1915, 2.3 per cent. of all the wheat, corn, rye, oats and buckwheat raised in the nation; and these same cereals were worth 3.9 per cent. of the value of the nation's crops which were estimated at $3.295.433.000, while the State crops were worth 12.5 per cent. more per bushel than the average price value of the country's crops, the total value of the five cereals named being $95,932,420.

Corn was king in 1915, ranking, in production, twentieth in the United States, with a yield of 54,792,000 bushels, harvested from 1,520,000 acres, valued at $41,641,920; wheat came next, ranking ninth in production, yielding 24,928,000 bushels, raised from 1,312,000 acres, with a total value of $26,174,400; the oats crop exceeded the production of 1914, the yield being 43,095,000 bushels, harvested from 1,094,460 acres, valued at $19,823,700, and ranking fourteenth in the Union. In the production of rye, Pennsylvania ranked fourth in the nation, with a total of 271,600 acres grown, yielding 4,672,000 bushels, valued at $3,971,200. Buckwheat, however, led all the states of the Union, ranking first in production, the yield being 5,540,000 bushels, raised from 277,200 acres, with a value of $4.321.200, the production being 35.1 per cent of all the buckwheat raised in this country. As usual, Lancaster county, in value of production of all farm products, is not only the banner county in the State, but leads every county in every state of the Union.

Other crops in the State show healthful advance. Pennsylvania is sixth in the production of hay. The crop in 1915 was 3,558,000 tons, valued at $56,572,200—the most valuable of any farm product. Potatoes ranked sixth in production, the number of acres planted being 273,360, yielding 20,502,000 bushels, the total value of which is $16,401,600. Including tobacco, hay, potatoes and the five cereals noted, the acreage devoted to staple crops of the State were 7,797,120, with a total valuation of $173,473,720.

LIVESTOCK

In some instances there has been slight increase in the number of livestock raised in the State and in other cases there has been a decrease; however, the livestock industry forms an important part of the State's asset. The approximate total value of the livestock on the farms of Pennsylvania according to the report of our Statistician is $167,843,000, classified as follows: Horses, 596,000, valued at $72,116,000; milch cows, 952,000, estimated value being $52,836,000; other cattle number 644,000, valued at $18,676,000. There were reported at the close of 1915, 46,000 mules in the State, with an estimated valuation of $5,868,000. Milch cows have increased one per per cent. over 1914, which is gratifying when it is known that in 1914 15,000 cattle, largely milch cows, were slaughtered on account of the epidemic of the foot-and-mouth-disease. There is a slight decrease in the number of horses over the preceding year, owing, doubtless, to the large number being shipped to the battlefields of Europe.

The number of swine in the State is 1,186,000 valued at $13,974,800. But little change is noticed in this industry, it remaining about the same. In the epidemic of foot-and-mouth-disease in 1914, 13,000 were killed. There is a lamentable decrease in the sheep industry—there being 860,000. In 1900 there were 1,102,000. The Pittsburgh Dispatch, in an editorial, thus expresses the cause of this alarming decrease:

"The very active and alert Department of Agriculture of Pennsylvania, issues a report which is of importance paramount to mere statistics. The very kernel of it, or the meat and the wool of it, is that mutton-loving dogs, which sleep by day and gorge o'nights, have so preyed on the flocks of those animals most beloved in poesy, both sacred and secular, that farmers are being discouraged from producing for the market the toothsome spring lamb or the mature freshlings which produce fleece more precious than the Golden Fleece of Jason, and meat from times incomputably ancient has been so delightful a thought for the domestic table."

Here is the beginning and ending of the story of the decline in the sheep industry in Pennsylvania, that at one time was the leading State in the Union in sheep raising. The thousands of prowling and worthless curs that infest the State has brought about this state of affairs. Stringent laws should be enacted against the useless dogs, and I would respectfully request your Excellency to impress upon the next Legislature the necessity of passing a measure that will protect this great industry. The tens of thousands of acres of our unoccupied lands would be a paradise for sheep raisers and form one of the most valuable assets of the farmer.

WORK DONE BY THE DEPARTMENT

BUREAU OF FARMERS' INSTITUTES AND FARM ADVISERS

As an educational agency, the Bureau of Farmers' Institutes has made phenominal advancement in the past fifteen years. At the opening of the Twentieth Century, there was in the State a pronounced apathy concerning the institutes held under the direction of the Bureau. Thousands of farmers, at first, failed to see the importance of scientific and practical instruction in the maintaining of the soil and the cultivation of agricultural products, hence they did not see the necessity of attending the meetings of institutes, claiming that they knew as much about farming as the speakers furnished by the Department. They followed the traditions handed down by their fathers, farmed in the old way until their acres produced less and less of the staple crops, having practically worn out their land, depleting it of the constituent elements that go to make good soil.

Because of this indifference manifested to learn new methods, the early institutes were but meagerly attended and the interest shown by those who did attend was correspondingly indifferent. However, the Director of Institutes did not become discouraged, but continued his progressive and aggressive policy and supplied the best men who could be secured to go before the people with a newer agriculture, based on scientific standards, practically expounded in language and terms that could be comprehended by the average farmer.

And what is the result of this persistent endeavor upon the part of the Department through this Bureau? So great has been the uplift along all lines of agriculture, that everywhere in the State there is a gratifying demand for institutes and movable schools; and where the attendance fifteen years ago were by the hundreds, to-day the thousands throng the buildings where the meetings are held, in many instances, to their fullest capacity. The roughest weather or distance does not dampen the enthusiasm of the farmers of the State, but, with their families, they sit for hours listening to the corps of efficient men employed by the Department to impart instruction. In the progress of the work, instructors who did not measure up to the standard were taken from the force and men more active, who kept in advance of those who were to be taught, were supplied. These instructors, students in up-to-date agriculture, entered upon their work thoroughly equipped to perform their duties. They were selected for high standard of efficiency, men of such mental caliber and training as to quality them to discuss the various subjects assigned and answer all reasonable and proper questions along their special lines.

As an evidence of the mighty uplift in agricultural education, the demand for institutes cannot be met with the present appropriation, and from several of the counties the farmers are asking additional institutes from one to four days.

The report of the Director of Farmers' Institutes and Farm Advisers, finds its proper place in this Annual Report, and the reader is referred to the valuable information therein contained. As stated by the Director, during the season, ending July 15, 1915, there were held in regular institutes and movable schools 1,162 sessions, with an attendance of 183,400. There were in attendance at special institutes 18,118; harvest home picnics for which State lectures were furnished by the Department, 32,600, making a grand total of 216,000.

FARM ADVISERS

This important line of work for the imparting of agricultural education is comparatively a new feature of the Department, and is under the supervision of the Director of Institutes, the report of which is a part of the general report of the Director, wherein a brief resume is given of the work accomplished by the corps of ten advisers, especially employed in their various lines but nine months of the year; the balance of the time being given directly to institute work.

A perusal of the report gives but a slight idea of the good accomplished by these experts of the Department. The results of their personal visitations to the farms and homes of the State cannot be estimated; and, coming as they do in direct touch with the individual, the instruction they impart is invaluable.

The co-operative feature brought to the people by the expert on Co-operation in Farming has been of untold benefit to the 30,000 and more who were addressed at the 161 public meetings and 50 private gatherings. The farmers of the State are awakening to the necessity of co-operation, not only in the buying of equipments required in carrying on the farm industry, thereby saving thousands of dollars to the tens of thousands of farmers directly and indirectly interested, but in the sale and marketing of farm products, thereby bringing in a net return of more than can be realized by the ordinary methods of disposing of the proceeds of the garden and farm.

The farmers of the State are awakening to the needs of proper system of drainage, and many inquiries come to the Department as to what methods to adopt to best benefit low and swampy lands. The expert on Drainage and Water Supply visited 269 farms, giving suggestions as to methods to adopt, and much commendation of his work has reached the office by letter and otherwise. Reference to the report gives a brief outline of the conditions that exist in the State.

The two branches, market gardening and fruits, within the past ten years, has taken a prominent place in the agricultural life of the Commonwealth. The demands for the services of the expert, therefore, on Market Gardening and Fruits has been unusually great. In all, he visited 550 farms, attended fifty agricultural meetings and demonstrations and came in contact with 22,000 persons, delivering addresses along the lines in which he is specially engaged.

The remarkable interest taken in Poultry Husbandry in Pennsylvania is unprecedented in the history of the State and the unusual number of requests coming to the Department for information on this "farmers' side-line" has brought to the people of the State two of our most successful and trained poultrymen to serve as Advisers on Poultry. These experts have visited every county of the State giving attention to the wants of poultry raisers; also have addressed meetings, some of them very largely attended, on the subject now uppermost in the thought of the people.

The experts on Soils and Farm Crops have been busy in their line advising farmers how to obtain better soil and larger crops. Under their instruction, old methods of farming are being discarded and newer forms of cultivation of the lands are coming to the front.

Twelve thousand farmers have been reached through the helpful agency of the advisers on Dairying and Animal Husbandry. As a result of their visits, there has come a marked improvement in the replanning of farm operations, the erection of buildings and the sanitary surroundings of the farm structures and the beautifying of the premises.

The homes, where the wives, mothers and daughters dwell, have not been neglected by the Department; but the expert on Home Sanitation and Household Economics, the only lady on the force, has met and mingled with women of the homes of the State imparting helpful instruction, thereby lightening the burdens of our women and bringing them in touch with a thousand-and-one things that has brought sunshine and cheer to many a housewife.

All told, 7,665 farms of the State have been visited in about nine months time by the corps of Advisers. None can estimate the great good that has come to the farmers by the instruction given by these men and one woman.

DAIRY AND FOOD BUREAU

The Commissioner has submitted a detailed statement of the operations of the Bureau for 1915, which, to be appreciated, should be read in its entirety. All past records of the Bureau are shown to have been broken. The same vigilance in administering the laws charged to the Department for enforcement was observed and the same faithfulness that has characterized the work of the Commissioner and his employes for years was shown. Outside of the protection against disease and accident, there is no more important work than that of protecting the people of the State against adulteration of foods or those tainted or otherwise unfit for consumption.

The slogan of the hour is, "Save the Babies;" and there has been a State-wide as well as Nation-wide agitation on the subject and lovers of childhood are awake to the saving of the children. Being the most important food for children, and, in many cases, the only food up to a certain age, the purity of the milk supply is of paramount importance to the health and life of the babies. The Dairy and Food Bureau has given special attention to the milk production of the State, particularly looking after adulterations and whether it contained less than the standard amount of butter-fat or solids. Fifty-one hundred and ninety-three samples of milk were analyzed by the chemists of the Department and nearly 500 cases terminated because of adulterations of this product or having less than the standard amount of solids. In 230 cases the evidence and tests showed adulterations of original composition of milk by watering or skimming, or both. One very remarkable statement is made by the Commissioner: That but one case of added preservative (formaldehyde) was found; whereas, eleven years ago there were found in the samples of milk gathered, 600 cases of formaldehyde preservative.

There has been a marked increase in the number of oleomargarine licenses issued for the year—in fact for nine years this yearly increase has been going on. As an evidence of the successful operations of the Bureau, nine years ago, in Philadelphia, there were but three dealers who had license to sell oleomargarine; in 1915, there were granted to Philadelphia alone, 300 licenses to sell same. This large increase in the number of licenses was due to the vigilance of the field agents in prosecuting dealers selling oleomargarine for butter. Last year the activity of the agents in apprehending violators of the pure food laws has been more marked than before; and because of this activity, there has been an equally marked improvement in the foods of State.

During the year the chemists of the Department analyzed 8,939 samples of various food stuffs, in which were found the following violations of the pure food laws and for which prosecutions were made: Milk, 625; coffee and chicory, 2; cold storage goods, 75; eggs, 17; miscellaneous foods, 175; ice cream, 8; non-alcoholic drinks, 76; oleomargarine, 16; renovated butter, 2; sausage, 25 and vinegar, 101.

I would call your Excellency's attention to two laws that should be on the statute books of the Commonwealth to make complete the laws of the Department in the carrying out of the purposes for which the Bureau was established: A Sanitary Law which would apply to creameries, cheese factories, condenseries, canneries or other places where foods are manufactured for sale. The other measure I would call to your attention, is a law prohibiting the sale of adulterated or misbranded alcoholic liquors.

BUREAU OF ECONOMIC ZOOLOGY

The report of the Economic Zoologist is published as a part of this Annual Report, in which is given, in detail, the work of that Bureau. The collection of insects, both beneficial and injurious, as classified, is considered equal to the best in the State, and are arranged by the Entomologist so that they can be seen and studied, and many take advantage of the opportunity, especially school children.

The field work of the Bureau has been carried on by the Orchard Inspection Service, and it is worthy of note, that during the year the first orchard inspection begun eight years ago was completed this year.

Orchard demonstrations were continued, there being held during the year 262 public demonstrations. Ten hundred and fifty-one visits were made to individual orchards by the inspecting force.

The nursery inspection work has been pushed with vigor, every nursery in the State receiving at least two visits during the year from our inspectors. The magnitude of this feature of the Department is apparent when it is to be considered that there are in Pennsylvania, 251 nurseries.

Your Excellency's attention is called to the detailed report on bee-keeping, the first full report on this most important industry ever made through this Department.

Besides the regular work of the Bureau, much activity was given to the study of obnoxious animals, birds, rabbits and other animals and the preservation of beneficial species. Special emphasis has been placed on the construction of bird nesting boxes and the people of the State, especially the schools, are becoming deeply interested in procuring shelter and food for our birds.

REPORT OF THE STATE VETERINARIAN AND SECRETARY OF THE STATE LIVESTOCK SANITARY BOARD

By virtue of his office, the State Veterinarian is the Secretary of the State Livestock Sanitary Board whose reports for the years 1914 and 1915 are incorporated in this Annual Report of the Department. Owing to the extensive outbreak of foot-and-mouth-disease in the fall of 1914, and in view of the immense work it entailed upon the Board, for its suppression, it was deemed inadvisable to issue a report for that year, hence the reports of the operations of the Board for the two years are combined.

There is a misconception abroad throughout the State as to the purposes and work of the State Livestock Sanitary Board; that its work is or should be specifically directed to the protection of public health, notwithstanding the stupendous expense such a course would entail, running into the millions. The primary and essential duties of the State Livestock Sanitary Board, as expressed in the law charged to the Board for enforcement, is to protect the health of domestic animals and the conservation of the livestock industry.

The work of the Board, as in other years, was carried on under six divisions, the division of Meat Hygiene being the first to be treated in the report. It is a matter of note that the Meat Hygiene law of Pennsylvania, approved in 1907, was the first State Hygiene law enacted in the Union, and to-day is the only State that has such a law on its statute books. In this respect Pennsylvania has taken high ground in protecting the people of the State from dishonest and unscrupulous meat dealers in placing upon the market diseased and unwholesome meats. The elimination of filthy and undesirable slaughter houses and meat markets comes within the regulations of the law.

It should be noted, in the enforcement of the provisions of the law, that the agents of the Board are not expected to do police duty, to act as detectives in their work; but are expected to act in the capacity of advisors, to spread the gospel of sanitation and cleanliness and to show the difference between diseased and unwholesome meat and the sound and wholesome product. This course pursued by the agents is salutary and proving effective in removing unsanitary conditions and in the marketing of meat that is fit for food. The State Livestock Sanitary Board is on the eve of a State-wide movement for clean slaughter houses and meat markets, and in the next report the results of this movement will be apparent.

The following number of animals, carcasses and organs examined, together with meat products, during the two years, indicates the wide scope in the work of the Board:

Number of animals examined,	18,217
Number of carcasses examined,	69,497
Number of organs examined,	86,666
Meat and meat products examined,	2,103,254 pounds.

A detailed report of transmissible diseases of animals appears under that head. This is the most important work of the Board, and close attention was given to the ordinary diseases that may be transmitted from animal to animal. However, the most transmissible disease of all ruminants and cloven-footed animals is the foot-and-mouth disease, from which, as an epidemic, the State suffered great losses during the latter part of 1914 and the first part of 1915. The first case was found in the State on October 29, 1914, and the last case discovered was on April 25, 1915. However, there was a general quarantine on some portion of the State extending 265 days. The infection occurred on 788 farms. The total amount of money used to suppress the scourge, and exterminate the disease was $668,441.66. This, however, represented but a small part of the losses that this disease caused the people of Pennsylvania. In fact it is not possible to estimate, even approximate in dollars and cents the amount of loss to those engaged in raising or handling livestock, farm products, etc., through the loss of business caused by restrictions, embargoes, etc.

According to the summary of Aphthous Fever in 1914 and 1915, the epidemic affected 34 counties of the State, causing the loss of 788 herds, representing 15,120 cattle, 11,035 swine and 375 sheep.

Hog Cholera, one of the transmissible diseases of livestock, existed in 52 of the 67 counties of the State, though not in virulent form, scarcely affecting two per cent. of the whole number of hogs raised in this State, which were in the neighborhood of 1,150,000 in 1915. The number of hogs examined in 1914 and 1915 were 31,980, of which number 8,529 showed symptoms of the disease. The number of animals vaccinated in the two years were 24,545. The deaths resulting from Hog Cholera previous to vaccination were 6,004 and after vaccination, 5,131. The almost complete control the State Livestock Board have of this disease should be an inducement for the farmers of the State to engage in swine husbandry which shows such good results as a money-maker.

The rabies situation in the State is reported to be much improved. The very prompt action of the Board in rigidly quarantining localities where the disease was found reduced very materially the number of cases of rabies. From the statement submitted it is learned that the number of cases reported in the two years were 492, number of animals quarantined, 3,312, localities quarantined, 33, number of animals killed, 2,339 and the number of persons bitten by rabid dogs, 341.

Tuberculosis of animals is the most generally distributed of the transmissible diseases, and is common to man and animals; and has been found in birds, fishes and reptiles, and in rare cases, in horses. But, as a disease, its greatest economic importance in relation to agriculture is the extent it is found in cattle and swine.

It is worthy of note in the summary submitted by the State Veterinarian, that for twenty years since the creation of the State Livestock Sanitary Board, the number of herds tested with tuberculin were 14,363; number of cattle tested, 192,310; number that reacted, 24,408 and the number of herds found to be free of tuberculosis, 7,174.

BUREAU OF CHEMISTRY

The Bureau of Chemistry has reached a high standard of proficiency. The quarters in the Capitol being cramped and lacking proper facilities to carry on the increasing and additional work that demaned more apparatus, the Board of Public Grounds and Buildings fitted up at considerable expense, a building in the Capitol Extension, formerly used for school purposes and equipping same with up-to-date apparatus, the Bureau was transferred late in the year and is ready to meet the additional demands on the Laboratory in the examinations of Paint, Putty and Turpentine, and of Lime in accordance with the acts of the last session of the General Assembly, the enforcement of which is placed with the Secretary of the Department.

The question of feeding domestic animals is of great importance, not only in unadulterated feeds, but in the constituent elements that enter into digestible feeds. In earlier years livestock were not fed with a view of the feeding value of the feeds; to-day that is the problem confronting dealers and consumers, and next to unadulterated feeds, the composition of feeding stuffs cannot be estimated.

With the usual alertness in detecting adulterated feeds and feeds below standard, the Bureau, though its agents and chemists, have rendered the State valuable service. The feeding stuffs law of Pennsylvania is considered the best in the Nation, very frequently quoted, and many of its provisions have been incorporated in the laws of other states. The purpose of the act is not only to detect spurious feeds or those unfit to be fed to animals, but is educational. It is the purpose of the Bureau to give facts to the citizens of the State as to what feeds they should buy and those of greatest value for special lines of feeding.

The report of the Chief Chemist shows that the general character of the feeding stuffs sold in 1915 was good. Fifty counties of the State, embracing 293 towns, were visited by the Special Agents of the Bureau, and 1,264 official samples of feed obtained. There were over 1,600 different brands of feed registered. It was impossible for the Bureau to ascertain the correct figures as to the number of tons of feeding stuff sold in Pennsylvania, as some of the larger firms refused to give the data; but by a careful search it is estimated that more than 600,000 tons were sold in 1914. This estimate indicates the enormous trade in food for the animals of the State.

The usual careful examinations of the samples gathered were made in the Laboratory to ascertain if the guarantees were properly made; they were also microscopically examined to learn if the ingredients claimed were really present in each case. These critical examinations show that the number of feeds adulterated or not up to standard are growing less and less each year. This excellent record is due to the vigilance of the agents and chemists of the Bureau, who are ever on the watch for feeds unfit for animals. The citizens of the State can be assured that their interests are looked after by this Department which is pledged for the protection and betterment of the citizens. I am sure your Excellency will be gratified with the most excellent service rendered the people of the Commonwealth by the Bureau and its official family.

The provisions of the Linseed Oil Act were carried out as far as the funds would allow. The act passed at the session of the General Assembly of 1915, regulating the sale of Paint, Turpentine, and Putty, the enforcement of which has been delegated to the Secretary, is another evidence of the purpose to protect the people of the State from spurious materials that are palmed off on an unsuspecting public as genuine. The presence of this law on the statute books of the Commonwealth will have a healthful influence upon the manufacture and sale of these materials.

In carrying out the provisions of the law regulating the sale of seeds, 221 official samples were secured, representing 19 kinds of seeds. The object of the Seed Law is to improve the quality of seeds which are sold in the State, to protect consumers against purchasing seeds which are impure and which contain noxious weeds, by prohibiting the sale of seeds which are inferior in quality and below standard.

The appropriations in carrying out the provisions of the various acts which the Department is charged in enforcing is entirely insufficient to properly carry forward the Bureau. It is impossible to make a thorough inspection of all the articles enumerated in the several acts, and I would respectfully suggest to your Excellency to recommend to the next session of the Legislature appropriations sufficient to enable the Department to further protect the consumers of the State in materials that are spurious or inferior in accordance with the intent of the various acts charged to the Department for enforcement.

BUREAU OF STATISTICS

This Bureau was created in 1913, hence is yet young, but shows much vigor. Statistics are generally regarded as "stale" reading; but there is no better way to indicate progress than by comparison. Reference to the report of the Statistician indicates sufficient evidence of the progressive policy of the Department in bringing to the people of the State, in succinct form, what crops Pennsylvania raises, amount of each, and the prices received for same. The data does not come to the people once a year, as formerly, consequently was of no benefit whatever, but monthly and fresh from the hundreds of responsible collectors in every county of the Commonwealth. I am glad to state to your Excellency that these monthly crop reports and the other data published in connection therewith has attracted Nation-wide comment and has been favorably spoken of by many in the State and through the public press. In an editorial in one of the leading newspapers of the Commonwealth the editor referred to the magnitude and value of the various crops in the State as published in the Crop Reports, and that the Bureau had done more in one year to inform the people of the food supply than was done in a decade previous.

The Bureau of Statistics, through its monthly livestock, crop and market reports and the publicity that is given them, acts as an agency to bring the consumer and the producer together for their common good. The statistical reports show the production and price of farm products in the various townships of the State and afford the commission agents, and all other buyers information that leads to the farmer finding a market for his produce. This feature is being enlarged upon each month and promises to be a big help in solving the marketing problems of the farmers of the State.

The report with its valuable information and comparisons finds its place in this Annual Report of the Department. There are two things I would call to your Excellency's attention in the report of the Bureau: First, to the immense values locked up in farmers' home fertilizer, manure, coming from the farm alone, the approximate production of which is shown as $14,322,000. This is a great asset to the farmers of the State, which costs but little, and adds very largely to the maintenance of the soil and the increased production of the staple crops of Pennsylvania. The people of the State have been slow to see the importance of this great fertility agent and its proper conservation.

The second statement taken from the report of the Bureau, to which I would call your attention, is the very complete data relating to the killing of sheep by dogs in 1914. No comment is necessary as the report shows the State-wide loss that comes to the farmers of Pennsylvania.

Two important publications were published as bulletins of the Department, prepared and compiled by the Statistician, viz: "Unoccupied Farms for Sale in Pennsylvania." and "Creameries, Cheese Factories, Milk Condenseries and Canneries," in operation in the State. Another bulletin, giving a more complete list of farms for sale in the State, is about ready for the printer. This publication gives a description of over 300 farms for sale located in fifty-six counties.

COMMERCIAL FERTILIZER

The fertilizer control work, as usual, has been directly under the supervision of the Secretary, who has charge of the administration of the laws regulating the sale of same. The tonnage reported as sold in the State during the year was 316,319 tons, valued at $8,590,-

000.00. The registration of fertilizers showed 1,488 brands, bringing into the State Treasury in fees of $25,365.00. There were 2,454 samples collected during the year by 13 agents who canvassed their districts twice during the year.

Legislation is needed in an amended fertilizer law changing the manner of collecting the revenue from a fertilizer tax to a tonnage tax. As there is a growing tendency of the general trade to reduce the number of brands, thereby resulting in a loss of revenue to the State, a tonnage tax would stop this reduction, as the tonnage remains from year to year normally the same.

THE AGRICULTURAL COMMISSION

As per Act No. 240, approved by your Excellency, May 18, 1915, a State Commission of Agriculture was created. Upon this Commission were appointed representative citizens of the State, representing the various lines of agriculture, who have entered upon their duties in studying the whole subject as it relates to the Commonwealth. Since the appointment of myself as the Secretary of Agriculture, but two meetings of the Commission have been held, hence nothing of importance has been done, excepting to outline the policy of the Department and to discuss the great problems that are to make for a greater agriculture in Pennsylvania.

The personnel of the members of the Commission reflects credit on your Excellency's judgment in their appointment, and with their co-operation the Department anticipates branching out on new and very important lines which we believe will be for a great uplift along all lines of agriculture in the State.

BUREAU OF PUBLICATIONS

During the year 1915, the Department issued 11 bulletins, Nos. 260 to 270, both inclusive. The demand for Department reports and bulletins is very great, each year showing an increased interest in agricultural knowledge over the preceding year. Requests come from the schools of the State for literature along agricultural lines, and many High Schools use the bulletins of the Department in class study.

Since 1899, 15 annual reports, aggregating 13,000 pages and 228 bulletins aggregating 20,165 pages have been published. During the same period there has been distributed to the people of the Commonwealth, various states of the Union and foreign countries, about 550,000 copies of the Department publications. This number does not include the annual reports distributed by the members of the Senate and House of Representatives, aggregating in 15 years about 210,000 making a total of 760,000 copies of reports and bulletins sent out for the information of the people in agriculture and allied subjects.

Neither does the above number include the monthly bulletins issued by the Dairy and Food Bureau and the Bureau of Economic Zoology, from which has gone out during the past 15 years at least 1,000,000 copies making a grand total of more than 1,760,000 of copies of literature for the benefit of the general farmer, trucker, fruit grower and producer of livestock, etc., distributed during that time. There are on hand at the present time for distribution more than 100,000 publications.

CONCLUSION

Having been connected with the Department as its executive officer less than three months, it is apparent to your Excellency that I have not been able to study the great problems that confront agriculture in Pennsylvania and to arrive at any definite conclusion as to what is needed to develop and expand this great industry. My time thus far has been occupied in a partial reorganization of the work of the Department and refitting and rearranging the rooms. The Bureau of Publications has been created thus centralizing the distribution of bulletins, etc., under one head. A Bureau of Disbursements has been established, where the accounts of the Department and all the Bureaus, under the immediate supervision of the Secretary, are kept thus simplifying the methods in the keeping of receipts and expenditures.

On entering upon my duties, I found a lamentable ignorance of what the Department stood for, and but little reference made to it in the public press. In following up the aggressive policy inaugurated, a Publicity Bureau was created, from which is issued a Weekly Press Bulletin released every Monday and sent to more than 900 newspapers and agricultural journals of the State containing concise statements of what the Department is doing and giving to the public the thought and suggestions of our best informed experts. These suggestions, coming first-hand, go each week to the tens of thousands of homes giving advice and counsel on every subject that in any way is related to farm and home life. The work of this Bureau is yet in its infancy, but from reports obtained, a marked interest has been aroused and the public press are requiring the articles sent and many have made favorable comment on the new departure.

In conclusion, I wish to express my appreciation of the courtesy you have shown me and the thoughtful interest you have manifested in the operations of the Department and the great farming constituency back of it.

I have the honor to be

Sincerely yours,

CHARLES E. PATTON,
Secretary of Agriculture.

TWENTY-FIRST ANNUAL REPORT OF THE BUREAU OF FARMERS' INSTITUTES' FOR SEASON OF 1914-1915

Harrisburg, Pa., January 1, 1916.

To the Hon. Charles E. Patton, Secretary of Agriculture:

Sir: I have the honor to present herewith the Twenty-first Annual Report of the Bureau of Farmers' Institutes. During the past year the Farmers' Institute work was under the supervision of Hon. A. L. Martin, who resigned, November 30. Therefore, it gives me pleasure to make the following report:

INSTITUTES AND MOVABLE SCHOOLS

There were held the season ending June 1, 1915, in the different counties, 456 days of Institutes and Schools, divided in 1162 sessions, the total attendance at which was 183,400; attendance at Special Institutes, 18,118, harvest home picnics, 32,600, making a grand total in attendance of 216,000. Movable schools, continuing three to four days each, were held in three counties, consisting of Columbia, Montour and Cambria. These schools have continued to teach and demonstrate lessons in dairying, horticulture, poultry, domestic science and home sanitation; as a result of which a marked improvement may be noted in dairying by the use of the Babcock test, the unprofitable cows being eliminated from the herd, barn sanitation and conveniences are taking the place of old and unsanitary methods. Horticulture as developed by experts is being practiced by thousands of farmers in the State with very satisfactory returns.

As a result of teaching poultry at our Farmers' Institutes the farm poultry of the State is being rapidly improved, the old mongrel hen is supplanted by the thoroughbred stock, fed and housed in such a manner as to bring profitable results in both egg production and poultry for the market. In home sanitation and domestic science, health conditions and the preparation of foods, also high phase of social life on the farm and demonstrations in cooking as illustrations of convenient kitchen equipment were successfully discussed.

FARM ADVISERS

To give a slight idea of how the Farm Advisers are appreciated by the farmers of the State, and the good they have accomplished, we give herewith a few statistics of their existence, ending November 30, 1915 (the date on which the Advisers enter into the Farmers' Institute work until the middle of March, 1916). During this time 7,665 farms were visited, advice and counsel given the farmers on the individual problems that confronted them. The lady engaged as an adviser on Home Sanitation and Household Economics has been called for by Home Clubs, Civic Clubs, private homes and schools.

The Adviser on Co-operation in Farming, Mr. E. B. Dorsett, visited 45 counties in the State, many of them several times, spending much of his time in perfecting farm organizations, such as the Grange, Farmers' Clubs, Farmers' Unions and other farm organizations The nature of his work makes it imperative to work with some organization, and in most sections of the State he found the best medium to extend his work and bring him in contact with the farmers at the least expense was the Grange. In other sections he found that the Farmers' Clubs, Farmers' Unions and the American Society of Equity were valuable agencies through which to work out his co-operative plans. All of these organizations gave valuable assistance and in return received many benefits. 161 public and 50 private meetings were addressed during the season. The average attendance at these meetings was 150, making a total of 30,000 farmers addressed. Through the medium of his work many sales were made in agricultural machinery, and implements bought and sold.

If space would permit we could name more than 500 organizations that bought and sold through his co-operative efforts. He supplied approximately 3,000 tons of fertilizer and fertilizer chemicals at an average saving to the farmer of $5.00 per ton, 40 tons of binder twine at a saving of 2½ cents per pound, 2,000 tons of feed at a saving of $4.00 per ton. These are only a few of the many transactions in which the farmers were able to save money. Fully 50,000 farmers were benefited directly or indirectly by these transactions. In addition to buying and selling, he gave assistance in marketing products. About 100 carloads of potatoes were sold which yielded the farmer from ten to fifteen cents per bushel more than he could have got at his local market, 100 cars of hay and straw during the year bringing the farmer a net return of from $2.00 to $4.00 per ton more than he could have realized by selling to the local dealer as well as many other crops which space will not allow us to itemize.

Charles G. McLain, Farm Adviser on Drainage and Water Supply, has visited almost every county in the State, laying out systems for over 269 farms with the following result: In some cases the drainage was very great and all cases where his recommendations have been carried out the benefit has been of such a character that the production has increased considerably, proving that tile drainage, when properly put in, is a paying investment. The different kinds of soil in Pennsylvania require different methods of drainage. In many cases a thorough drainage system is necessary and in other cases a random system is enough to accomplish all that is necessary. He has assisted in laying out systems for drainage of orchards and has been called into consultation as to planting an orchard in such a way as to fit it for future drainage. In some cases laying out drainage on hilltops which would seem quite unnecessary, but these hills were overlaid with a hard pan or some impervious substance, and, of course, the water had to be gotten rid of in some other way than evaporation, and the only way to carry off this water was a system of drainage.

He has been called upon quite often by the farmers living in river bottom land where drainage is very necessary as the land along the banks of the river is higher than back next to the hills, thus holding the water and preventing early working of the soil. This is a condition that exists along all the rivers of Pennsylvania to a large extent and it is our purpose to arrange for meetings at points of this kind and explain to the people just what they should do to overcome these conditions and bring this rich river bottom land into a good state of cultivation. In water supply he has been called to a number of farms and found conditions demanding different recommendations, some needing gravity systems at a small cost and some at a considerable cost; others could use the hydraulic ram and still others have to use either a gas pump or windmill with storage tank, also giving advice along sanitary sewerage.

Mr. Sheldon W. Funk, Farm Adviser on Market Gardening and Fruits, has worked in 46 counties of the State, making from one to twenty-seven different visits to a county, having made 550 visits to individual farms, and in each case gave the farmer practical advice that he was desirous of gaining. He attended 50 agricultural meetings and demonstrations, and addressed 22,000 people at said meetings, and attended eight County Fairs judging fruit and vegetables. At these meetings he would go over the entire orchard demonstrating the proper methods of preparing the soil, of setting and pruning the trees or of spraying and thinning the fruit. In other cases he would go through a well cared for orchard and then through a neglected orchard calling attention to the beneficial results of fertilizers, of tillage or of mulch or, again, showing the results of injury from insects and diseases.

The briefness of this report prevents us from entering into detail upon his line of work. However, we would mention such men who are extensively engaged in horticulture and who look to Mr. Funk for expert advice along his special line, i. e., E. L. Cressmen, Quakertown, Pa.; Dr. H. Walters, Spring Mount, Pa.; John McGowan and Ambrose Slichter, Elverson, Pa.; Edward Leinhard, Mauch Chunk, Pa.; William B. Farrell, Frankford, Pa.; and D. J. Engle, Beaver, Pa., as well as many other farmers of the State. The above named gentlemen are splendid farmers, but, as above stated, look to Mr. Funk to keep them posted on fruit and market gardening development.

W. Theo. Wittman and J. T. Campbell, Farm Advisers on Poultry, have visited every county in the State, having more applications than they could fill, giving attention to 1,500 calls. The personal calls have covered every phase of poultry husbandry and poultry keeping from showing a man how to set a hen or run an incubator or select his stock to equipping a large commercial plant and putting same on a paying basis; also lecturing before poultry organizations and other agricultural meetings with an attendance at these meetings of over 50,000 people. Mr. Wittman is especially at home as judge of poultry, and in this capacity attended fourteen different Fairs within the State, furnished plans and selected sites for poultry plants. Amongst the largest public institutions visited are as follows: Masonic Home, Elizabethtown, Pa.; Odd Fellows Orphanage, Sunbury, Pa.; Cheney Training School for Teachers, Cheney, Pa.

Prof. Franklin Menges and Mr. J. T. Campbell, Farm Advisers on Soils, visited quite a number of farms and addressed public meetings. Prof. Menges was kept quite busy during the summer months judging at County Fairs, farmers' picnics, etc., the benefits of which cannot be estimated. A few of the meetings addressed are as follows: The Dairy Township Farmers' Club, Westmoreland county, Scenery Hill High School, Scenery Hill, Pa.; Shearersburg High School, Shearersburg, Pa.; Agricultural and Horticultural Society of Lebanon county, Lebanon, Pa.; Pleasant Hill Grange, Gratz, Pa.; Corn Growers' Association, West Chester, Pa.; also attending County Fairs with soil exhibits. The above are a few of the hundreds of public meetings attended, which space will not allow us to itemize.

Dr. M. E. Conard and L. W. Lighty, Farm Advisers on Dairying and Animal Husbandry, visited every county in the State, reaching over 1,200 farmers; about one-half the farmers holding family meetings for their neighbors to procure information during the replanning of farm operations, remodeling and improving farm buildings, facilitating the marketing of products and urging the organization of cow testing associations were thoroughly advised. Also planning dairy barns for over 3,000 head of cows, together with silos, etc., working out plans for same, advising concrete construction upon the farm, serving as expert judges on livestock at many of the County Fairs and agricultural exhibits of the State.

Mrs. Jean Kane Foulke, Farm Adviser on Home Sanitation and Household Economics, has been earnestly working among the farmers' wives and has reached almost every part of the State with her demonstrations and lectures, demonstrating with her equipment, model beds, model yards, model bedrooms, model septic tank for sewerage in the rural homes, model garments for women and children, washing machines and other household equipment that will help the farmers' wife, the benefits of which cannot be estimated.

When we realize that the Department of Agriculture has received over 1,500 commendable letters thanking them for assistance rendered in supplying Advisers, which have saved the farmers of the State thousands of dollars, you can readily appreciate that this Bureau of the work is reaching the place among the educational forces in agriculture.

Our Annual Normal Institute was held at Conneaut Lake, May 25-27, 1915. This meeting was attended not only by Managers of Institutes in the various counties of the State, and practically all State Lecturers, but representatives of agricultural societies, local Granges, Farmers' Clubs and Farm Bureaus, and was the means of unifying much of the instruction given by the lecturers this year. Not only so, but great encouragement was given our lecturers in the work of developing greater thoughtfulness among the farmers of the State.

Herewith please find program which reveals, in a more condensed form, the subjects that were so thoroughly discussed by competent instructors at this meeting.

FARMERS' ANNUAL NORMAL INSTITUTE.

PROGRAM

First Session Convenes Tuesday Afternoon, May 25, 1915

MR. W. F. THROOP, Espyville, Pa., Chairman.

Call to order 1.30 P. M.

Address of Welcome, James E. Reany, Exposition Park, Pa.
Hon. R. C. McMaster, Adamsville, Pa.
J. T. Campbell, Hartstown, Pa.

Response, Hon A. L. Martin, Director of Institutes, Harrisburg, Pa.
L. W. Lighty, East Berlin, Pa.

1 "COMMUNITY BREEDING."
Prof. Helmer Rabild, U. S. Department of Agriculture, Washington, D. C.

2. "DISEASES OF FARM ANIMALS."
Dr. C. J. Marshall, State Veterinarian, Department of Agriculture, Harrisburg, Pa.

Note:—This Institute will be honored by the presence of Governor Brumbaugh, unless prevented by official duties.

Tuesday Evening, May 25, 1915.

MR. WM. C. BLACK, Mercer, Pa., Chairman.

Call to Order 7.30 P. M.

1. "AGRICULTURE AND THE PUBLIC SCHOOLS."
Prof. L. H. Dennis, Expert Assistant in Agricultural Education, Department of Public Instruction, Harrisburg, Pa.

2 "CENTRALIZATION OF PUBLIC SCHOOLS."
E. B. Dorsett, Mansfield, Pa.

3. "THE COUNTRY CHURCH; ITS RELATION TO AGRICULTURE."
Rev. B. Monroe Posten, Pottstown, Pa.

Wednesday Morning, May 26, 1915.

MR. WM. A. CRAWFORD, Cooperstown, Pa., Chairman.

Call to order 9.00 A. M.

1. "A, DEFINITE PROGRAM IN BREEDING FOR EGG PRODUCTION." (Illustrated).
Prof. James E. Rice, In Charge of Poultry Husbandry, Cornell University, Ithaca, N. Y.

2. "FORTY POPULAR VARIETIES OF POULTRY." (Illustrated.)
W. Theo. Wittman, Allentown, Pa.

Wednesday Afternoon, May 26, 1915.

Note.—This period will be devoted to social recreation.

Wednesday Evening, May 26, 1915.

MR. ARCHIE BILLINGS, Edinboro, Pa., Chairman.

Call to order 7.30 P. M.

1. "THE DRAFT BREEDS OF HORSES." (Illustrated.)
   Dr. Carl W. Gay, University of Pennsylvania, Philadelphia, Pa.
2. "THE PENNSYLVANIA EXPERIMENT STATION, ITS WORK AND LESSONS." (Illustrated.)
   Prof. R. L. Watts, Dean Experiment Station, State College, Pa.
3. "THE RELATION OF BIRDS TO AGRICULTURE." (Illustrated.)
   Prof. Wells W. Cooke, U. S. Department of Agriculture, Washington, D. C.

Thursday Morning, May 27, 1915.

MR. J. T. CAMPBELL, Hartstown, Chairman.

FARMERS' INSTITUTE SESSION.

Call to order 9.00 A. M.

THIS SESSION WILL BE DEVOTED TO GENERAL DISCUSSION FOR THE DEVELOPMENT OF MATTERS RELATING TO THE INSTITUTE, MOVABLE SCHOOL AND ADVISORY WORK THROUGHOUT THE STATE.

Opened by A. L. Martin, Director.

Thursday Afternoon, May 27, 1915.

MR. S. S. BLYHOLDER, Kelly Station, Pa., Chairman.

Call to order 2.00 P. M.

1. "SOME ORCHARD INSECTS AND THEIR CONTROL."
   F. H. Fassett, Meshoppen, Pa.
2. "PROFITABLE APPLE CULTURE."
   Sheldon W. Funk, Boyertown, Pa.
3. "POTATO GROWING; SEED SELECTION."
   Daniel Dean, President, New York Potato Growers' Association, Nichols, N. Y., R. D. No. 1.

GENERAL DISCUSSION.

Thursday Evening, May 27, 1915.

WOMENS' SESSION

MRS. MARTHA E. MARTIN, Harrisburg, Pa., President.

Call to order 7.30 P. M.

1. "EFFICIENCY IN HOME MAKING."
   Dr. Hannah McK. Lyons, Lincoln University, Pa.
2. "EDUCATION IN HOME ECONOMICS."
   Miss Sara C. Lovejoy, State College, Pa.
3. "SONGS THAT LIVE."
   Mrs. Rose Morgan, No. 400 Convent Street, New York City.

LIST OF COUNTY INSTITUTE MANAGERS FOR THE SEASON OF 1915-16

County.	Name and Address of Chairmen.
Adams,	A. I. Weidner, Arendtsville.
Allegheny,	C. L. Hood, Coraopolis, R. D. No. 3.
Armstrong,	S. S. Blyholder, Kelly Station.
Beaver,	Walter C. Dunlap, West Bridgewater.
Bedford,	W. F. Biddle, Everett, R. D. No. 2.
Berks,	H. G. McGowan, Geigers Mills.
Blair,	W. Frank Beck, Altoona.
Bradford,	F. D. Kerrick, Towanda, R. D. No. 9.
Bucks,	B. F. Wambold, Sellersville.
Butler,	W. H. Milliron, Euclid.
Cambria,	L. J. Bearer, Hastings, R. D.
Cameron,	R. P. Heilman, Emporium.
Carbon,	Edward Lienhard, Mauch Chunk, R. D. No. 1.
Center,	John A. Woodward, Howard.
Centre,	M. E. Conard, Westgrove.
Clarion,	J. H. Wilson, Clarion.
Clearfield,	Harrison Straw, Clearfield.
Clinton,	Joel A. Herr, Millhall.
Columbia,	A. P. Young, Millville.
Crawford,	W. F. Throop, Espyville.
Cumberland,	T. J. Ferguson, Mechanicsburg.
Dauphin,	E. S. Keiper, Middletown.
Delaware,	Thos. H. Wittkorn, Media.
Elk,	John G. Schmidt, St. Marys.
Erie,	Archie Billings, Edinboro.
Fayette,	John T. Smith, Dunbar, R. D. No. 32.
Forest,	C. A. Randall, Tionesta.
Franklin,	J. P. Young, Marion.
Fulton,	Frank Ranck, Hancock, Md.
Greene,	J. W. Stewart, Jefferson.
Huntingdon,	G. G. Hutchison, Warriors Mark.
Indiana,	S. C. George, West Lebanon.
Jefferson,	Peter B. Cowan, Brookville.
Lackawanna,	Matthew Rodgers, Mexico.
Lebanon,	Horace Seamans, Factoryville.
Lehigh,	Edward Shuey, Lickdale.
Luzerne,	P. S. Fenstermacher, Allentown.
Lycoming,	J. E. Hildebrant, Dallas.
McKean,	A. J. Kahler, Hughesville.
Mercer,	E. A. Studholme, Smethport.
Mifflin,	Wm. C. Black, Mercer.
Monroe,	F. S. Brong, Saylorsburg.
Montgomery,	J. H. Schultz, Norristown.
Montour,	J. Miles Derr, Milton, R. D. No. 1.

County.	Name and Address of Chairmen.
Northampton,	C. S. Messinger, Tatamy, R. D.
Northumberland,	I. A. Eschbach, Milton, R. D. No. 1.
Philadelphia,	David Rust, Horticultural Hall, Philadelphia.
Perry,	C. M. Bower, Blain.
Pike,	B. F. Killam, Paupack.
Potter,	A. T. Crittenden, Oswayo.
Schuylkill,	John Shoener, New Ringgold.
Snyder,	F. F. Glass, Freeburg.
Somerset,	Robert W. Lohr, Boswell.
Sullivan,	E. R. Warburton, Campbellville.
Susquehanna,	F. A. Davies, Montrose.
Tioga,	C. H. De Witt, Mansfield.
Union,	J. Newton Glover, Vicksburg.
Venango,	W. A. Crawford, Cooperstown.
Warren,	G. A. Woodside, Sugargrove.
Washington,	Jas. M. Paxton, Houston.
Wayne,	W. E. Perham, Varden.
Westmoreland,	W. F. Holtzer, Greensburg.
Wyoming,	G. A. Benson, Tunkhannock.
York,	G. F. Barnes, Rossville.

LIST OF INSTITUTE LECTURERS FOR SEASON OF 1914-15

Anderson, H. M., New Park, Pa.
Barnitz, C. M. Riverside, Pa.
Bond, M. S., Danville, Pa.
Campbell, J. T., Hartstown, Pa.
Card, Fred W., Sylvania, Pa.
Conard, Dr. M. E., Westgrove, Pa.
Cook, Prof. Wells, U. S. Department of Agriculture, Washington, D. C.
Darst, W. H., State College, Pa.
Dorsett, E. B., Mansfield, Pa.
Fassett, F. H., Meshoppen, Pa.
Faust, S. L., Hoboken, Pa.
Funk, Sheldon W., Boyertown, Pa.
Gooderham, H. M., Patton, Pa.
Groupe, J. Stuart, Jersey Shore, Pa., R. D. No. 4.
Herman, J. A. Fombell, Pa.
Herr, John D., Lancaster, Pa.
Horrocks, Wm., Souderton, Pa., R. D. No. 1.
Hulsart, C. C., Matawan, N. J.
Kline, Frank, Spring City, Pa.
Lighty, L. W., East Berlin, Pa., R. D.
Lyons, Dr. Hannah McK., Lincoln University, Pa.
Mairs, Prof. T. I., State College, Pa.
McCallum, M. H., Wernersville, Pa.
Menges, Prof. Franklin, York, Pa.

Mitman, Howard, Hellertown, Pa.
Noll, C. F., State College, Pa.
Orton, C. R., State College, Pa.
Patton, W. M., Mosgrove, Pa., R D. No. 2.
Phillips, E. L., New Bethlehem, Pa.
Phillipy, Dr. W. T., Carlisle, Pa.
Putney, Fred S., State College, Pa.
Rabild, Prof. Helmer, U. S. Department of Agriculture, Washington, D. C.
Row, Chas. A., Yardley, Pa.
Seeds, Robt. S., Birmingham, Pa.
Smith, R. S. State College, Pa.
Stout, W. H., Pingrove, Pa.
Struble, Vern T., Athens, Pa., R. D. No. 24.
Tomhave, W. H., State College, Pa.
Van Noy, Leon Otice, Troy, Pa., R. D. No. 66.
Watts, D. H., Kerrmoor, Pa.
White, John W., State College, Pa.
White, W. R., State College, Pa.
Wittman, W. Theo., Allentown, Pa.
Worthen, E. L., State College, Pa.
Wrigley, Paul I., Eddington, Pa.

ATTENDANCE AT PENNSYLVANIA FARMERS' INSTITUTES, 1914-1915

The following is a complete list by counties, of dates and places were Institutes, Movable Schools and Special Institutes were held throughout the State for the Institute year ending June 1, 1915:

PENNSYLVANIA FARMERS' INSTITUTES—SEASON OF 1914-15.

County	Place	Date	Days of institute	Number of sessions	Attendance by Sessions	Speakers Present		Attendance		
						Local	State	Average	Total	By counties
Adams,	East Berlin,	Feb. 1-2,	2	5	38, 35, 130, 76, 390	....	4	138	689	
	Hunterstown,	Feb. 3-4,	2	5	54, 35, 200, 125, 260	....	4	135	674	
	Bendersville,	Feb. 5-6,	2	5	60, 74, 145, 125, 260	1	4	133	664	2,027
Allegheny,	East Union,	Feb. 10-11,	2	5	54, 50, 95, 73, 110	....	3	76	382	
	Thorn Hill Home,	Feb. 12-13,	2	5	53, 48, 78, 85, 140	5	3	81	404	
	Oakdale,	Feb. 15-16,	2	5	60, 55, 200, 195, 375	9	3	177	885	1,671
Armstrong,	Spring Church,	Jan. 4-5,	2	5	100, 100, 300, 250, 350	....	3	222	1,110	
	Brick Church,	Jan. 6-7,	2	5	56, 75, 60, 125, 350	....	3	133	666	
	Worthington,	Jan. 8-9,	2	5	75, 78, 248, 250, 260	....	4	182	911	2,687
Beaver,	Mill Creek,	Dec. 14-15,	2	5	26, 14, 140, 38, 163	1	3	76	381	
	Fair View,	Dec. 16-17,	2	5	38, 18, 232, 105, 238	3	3	136	631	
	Darlington,	Dec. 18-19,	2	5	40, 46, 260, 187, 27	1	3	112	560	1,572
Bedford,	Buffalo Mills,	Nov. 16-17,	2	5	41, 90, 25, 100, 225	....	3	97	484	
	Cumberland Valley,	Nov. 18-19,	2	5	47, 30, 200, 190, 210	....	3	135	677	
	Friends Cove,	Nov. 20-21,	2	5	35, 35, 200, 160, 260	....	5	138	690	
(Special),	Bedford,	Dec. 9-10,	2	4	30, 40, 40, 56	2	1	41	166	2,017
Berks,	Temple,	March 1-2,	2	5	135, 53, 350, 145, 405	1	5	221	1,106	
	Centreport,	March 3-4,	2	5	82, 42, 270, 210, 290	1	4	179	894	
	Bally,	March 5-6,	2	5	185, 60, 315, 115, 140	3	4	187	935	
	Geigertown,	March 8-9,	2	6	85, 35, 82, 180, 205, 250	2	4	136	817	3,752
Blair,	Bald Eagle,	Feb. 12-13,	2	5	60, 140, 25, 100, 200	....	4	105	525	
	Geeseytown,	Feb. 15-16,	2	5	130, 280, 160, 190, 380	....	4	228	1,140	
	Martinsburg,	Feb. 17-18,	2	5	120, 400, 200, 260, 400	....	4	276	1,380	3,045
Bradford,	Spring Hill,	Jan. 15-16,	2	5	150, 220, 130, 208, 200	1	4	181	908	
	Herricksville,	Jan. 18-19,	2	5	84, 198, 88, 230, 300	3	4	180	900	
	Ulster,	Jan. 20-21,	2	4	80, 98, 232, 240	....	4	162	650	
	Granville Center,	Jan. 22-23,	2	5	68, 70, 164, 150, 140	....	4	108	542	3,000
Bucks,	Richlandtown,	Feb. 22-23,	2	5	125, 110, 400, 275, 500	....	3	282	1,410	
	Blooming Glen,	Feb. 24-25,	2	5	150, 125, 300, 300, 500	2	3	275	1,375	
	Doylestown,	Feb. 26-27,	2	5	200, 100, 300, 300, 250	3	3	230	1,150	
	New Hope,	March 1-2,	2	5	100, 100, 225, 125, 300	1	4	170	850	
	Newtown,	March 3-4,	2	5	150, 100, 250, 275, 425	2	4	240	1,200	5,885
Butler,	Eau Claire,	Jan. 11-12,	2	5	53, 133, 34, 57, 180	1	4	71	357	
	Winfield,	Jan. 13-14,	2	5	34, 375, 38, 80, 350	....	4	175	877	
	Jacksville,	Jan. 15-16,	2	5	75, 225, 95, 125, 300	....	4	164	820	
(Movable Institute School),	Butler,	Jan. 6-9,	4	6	20, 18, 125, 110, 45, 106	....	3	94	308	2,362

PENNSYLVANIA FARMERS' INSTITUTES—SEASON OF 1914-15—Continued.

County	Place	Date	Days of institute	Number of sessions	Attendance by Sessions	Speakers Present		Attendance		
						Local	State	Average	Total	By counties
Cambria,	Patton,	Feb. 19-20,	2	5	125, 100, 100, 125, 150	....	3	120	600	
	Nicktown,	Feb. 22,	1	3	60, 150, 20	....	3	77	230	
	Wilmore,	Feb. 23,	1	3	25, 60, 325	....	3	136	410	
	Salix,	Feb. 24-25,	2	6	100, 290, 160, 350, 340, 330	....	3	262	1,570	2,810
Cameron,	Emporium,	Nov. 23-25,	3	7	23, 20, 33, 60, 12, 22	....	3	31	216	216
Carbon,	Weatherly,	Feb. 8-9,	2	5	65, 60, 100, 75, 150	....	4	90	450	
	Big Creek,	Feb. 10-11,	2	5	125, 75, 200, 150, 250	....	4	160	800	
	New Mahoning,	Feb. 12-13,	2	5	65, 75, 225, 200, 275	....	4	168	840	2,090
Centre,	Center Hall,	Dec. 14-15,	2	6	15, 30, 44, 60, 90, 120	....	3	58	359	
	Unionville,	Dec. 16-17,	2	5	40, 45, 130, 160, 300	....	3	115	575	
	Phillipsburg,	Dec. 18-19,	2	5	60, 30, 160, 100, 90	....	4	70	340	1,274
Chester,	Honeybrook,	Nov. 13-14,	2	4	35, 115, 30, 55	....	4	59	235	
	Cedarville,	Nov. 16-17,	2	5	75, 165, 50, 120, 250	2	3	110	550	
	Byers,	Nov. 18-19,	2	5	55, 125, 70, 105, 135	1	3	104	520	
	Avondale,	Nov. 21-22,	2	4	42, 39, 35, 60	2	3	44	176	
	Doe Run,	Nov. 23-24,	2	5	85, 135, 100, 160, 200	3	3	136	680	
(Special),	Pottstown,	March 26,	1	2	60, 200	....	3	130	260	
(Special),	Parksburg,	Dec. 10-11,	2	4	75, 125, 158, 225	2	4	145	583	3,004
Clarion,	Salem,	Feb. 1-2,	2	5	35, 101, 59, 120, 205	....	4	105	523	
	Limestone,	Feb. 3-4,	2	5	95, 300, 125, 175, 415	1	4	222	1,110	
	Sligo,	Feb. 5-6,	2	5	300, 110, 280, 500, 210	....	4	280	1,400	
	West Freedom,	Feb. 8-9,	2	5	72, 250, 72, 228, 315	....	3	188	940	3,973
Clearfield,	Luthersburg,	Jan. 4-5,	2	5	40, 90, 180, 190, 220	....	3	144	720	
	Curwensville,	Jan. 6-7,	2	6	20, 30, 50, 100, 110, 180	....	3	98	490	
	Mt. Joy,	Jan. 8-9,	2	6	30, 70, 100, 200, 180, 230	....	3	135	810	
(Special),	Fandie,	March 16-17,	2	5	120, 160, 140, 160, 200	3	2	156	780	
(Special),	Hickory,	March 18-19,	2	5	185, 100, 200, 170, 240	3	2	173	865	
(Special),	Lawrence,	March 20,	1	3	100, 200, 160	1	2	152	460	
(Special),	McGees,	March 22-23,	2	6	105, 120, 130, 115, 200, 150	3	2	137	820	
(Special),	East Ridge,	March 24-25,	2	6	125, 160, 310, 130, 195, 205	1	2	171	1,025	6,590
Clinton,	McElhattan,	Feb. 19-20,	2	5	48, 50, 210, 110, 250	2	3	133	668	
	Mackeyville,	Feb. 22-23,	2	5	50, 102, 258, 122, 310	2	3	168	842	
	Beech Creek,	Feb. 24-25,	2	5	30, 90, 225, 175, 135	2	3	131	655	2,165
Columbia (Movable Institute School),	Benton,	Jan. 18-22,	5	9	450, 235, 375, 360, 440, 520	....	4	262	2,385	3.190

Crawford,	Mt. Hope,	Feb. 24-25,	2	5	110, 175, 190, 225, 175	....	3	175	875	
	Geneva,	Feb. 26-27,	2	4	30, 85, 26, 42	1	3	46	183	
	Spartansburg,	March 1-2,	2	5	80, 146, 70, 125, 205	3	3	125	626	
(Movable Institute School),	Westford,	Jan. 8-12,	4	10	75, 125, 200, 65, 125, 256, 120, 75, 120, 260	....	4	142	1,421	3,105
Cumberland,	Hogestown,	Jan. 4-5,	2	5	75, 350, 40, 215, 400	1	4	216	1,080	
	Oakville,	Jan. 6-7,	2	6	12, 82, 46, 36, 72, 200	1	3	74	448	
	Newburg,	Jan. 8-9,	2	5	115, 500, 95, 225, 425	....	3	272	1,360	2,888
Dauphin,	Linglestown,	Feb. 22-23,	2	5	35, 260, 86, 140, 215	....	4	147	736	
	Halifax,	Feb. 24-25,	2	5	44, 145, 76, 70, 190	....	4	105	525	
	Gratz,	Feb. 26-27,	2	5	245, 325, 55, 285, 390	....	4	260	1,300	2,561
Delaware,	Concordville,	March 8-9,	2	5	75, 25, 200, 75, 225	....	3	120	600	
	Village Green,	March 10-11,	2	5	55, 47, 250, 100, 275	....	3	144	720	
	Williamson School,	March 12-13,	2	4	50, 50, 125, 300	....	3	105	525	1,845
Elk,	St. Marys,	Nov. 18-19,	2	5	40, 28, 96, 38, 110	....	4	62	312	
	Rasselas,	Nov. 20-21,	2	3	140, 24, 128	....	3	97	292	
(Special),	St. Marys,	Feb. 20,	1	1	160	....	1	....	160	764
Erie,	Edinboro,	March 3-4,	2	5	65, 105, 65, 85, 100	....	3	84	420	
	Wattsburg,	March 5-6,	2	5	40, 104, 225, 200, 252	....	3	164	821	
	Corry,	March 8-9,	2	5	25, 55, 46, 151, 215	2	3	102	511	1,752
Fayette,	Ohiopyle,	Nov. 23-24,	2	5	40, 300, 40, 175, 350	....	3	181	905	
	Perryopolis,	Nov. 27-28,	2	4	75, 400, 450, 500	....	3	285	1,425	
	Old Frame,	Nov. 30-Dec. 1,	2	5	70, 110, 280, 260, 230	....	3	190	950	3,280
Forest,	East Hickory,	March 1-2,	2	5	24, 58, 110, 100, 190	1	3	96	482	
	Tionesta,	March 3-4,	2	5	56, 62, 224, 138, 250	....	3	146	730	1,212
Franklin,	Scotland,	Jan. 11-12,	2	5	120, 475, 40, 220, 290	1	3	229	1,145	
	Marion,	Jan. 13-14,	2	5	60, 310, 72, 220, 415	2	3	215	1,077	
	Dry Run,	Jan. 15-16,	2	5	187, 420, 115, 400, 510	....	3	326	1,632	
	Fannettsburg,	Jan. 18-19,	2	5	125, 350, 150, 225, 400	....	3	250	1,250	5,104
Fulton,	Warfordsburg,	Nov. 11-12,	2	5	70, 25, 110, 210, 210	1	3	125	625	
	Buck Valley,	Nov. 13-14,	2	6	12, 40, 60, 160, 150, 290	....	3	144	722	
(Movable Institute School),	McConnellsburg,	Feb. 8-11,	4	10	30, 75, 125, 50, 300, 350, 150, 150, 325, 350	....	3	210	2,105	3,452
Greene,	Rogersville,	Nov. 13-14,	2	5	75, 225, 175, 108, 350	1	3	146	733	
	Nineveh,	Nov. 16-17,	2	3	63, 21, 152	....	3	....	236	969
Huntingdon,	Warriors Mark,	Jan. 11-12,	2	5	50, 40, 260, 190, 60	....	3	120	600	
	Entriken,	Jan. 13-14,	2	5	60, 100, 90, 180, 210	....	3	128	640	
	Saltillo,	Jan. 15-16,	2	5	100, 160, 300, 280, 300	....	3	228	1,140	2,380
Indiana,	Homer City,	Feb. 26-27,	2	4	80, 75, 120, 140	....	3	104	415	
	Indiana,	March 1-2,	2	5	180, 160, 300, 200, 260	....	4	220	1,100	
	Heilwood,	March 3-4,	2	5	130, 110, 220, 280, 200	....	4	188	940	
	Trade City,	March 5-6,	2	5	170, 200, 220, 210, 220	....	4	204	1,020	
	Ambrose,	March 8-9,	2	5	170, 160, 220, 200, 240	....	4	198	990	4,465
Jefferson,	St. Johns Church,	Nov. 13-14,	2	5	40, 60, 60, 125, 225	4	3	102	510	
	Kirkman,	Nov. 16,	1	3	32, 53, 110	....	3	65	195	
	Roseville,	Nov. 17,	1	3	40, 40, 200	....	3	93	280	985
Juniata,	Thompsontown,	Dec. 21-22,	2	5	40, 65, 150, 120, 280	....	3	131	655	
	Waterloo,	Dec. 23-24,	2	3	90, 190, 200	....	3	160	480	1,135
Lackawanna,	Thompkinsville,	Nov. 16-17,	2	5	25, 40, 100, 115, 265	....	3	109	545	
	Bald Mount,	Nov. 18-19,	2	4	25, 80, 125, 100	....	3	82	330	
	Clarks Summit,	Nov. 20-21,	2	5	40, 20, 50, 50, 150	....	3	62	310	
	Madisonville,	Nov. 23-24,	2	5	13, 14, 75, 25, 225	....	3	70	252	
	Daleville,	Nov. 27-28,	2	5	40, 20, 110, 80, 250	....	3	100	500	1,937

PENNSYLVANIA FARMERS' INSTITUTES—SEASON OF 1914-15—Continued.

County	Place	Date	Days of institute	Number of sessions	Attendance by Sessions	Speakers Present		Attendance		
						Local	State	Average	Total	By counties
Lancaster, ...	Blue Ball, ...	Nov. 25, ...	1	3	65, 75, 200	....	3	110	330	
	Mechanicsville, ...	Nov. 27-28, ...	2	5	55, 210, 25, 110, 167	....	3	115	577	
	Lititz, ...	Nov. 30-Dec. 1, ..	2	6	42, 47, 240, 65, 115, 290	1	3	139	839	
	Ephrata, ...	Dec. 2-3, ...	2	5	50, 330, 40, 65, 380	1	3	161	865	
	Lampeter, ...	Dec. 4-5, ...	2	5	90, 215, 45, 115, 295	....	3	153	765	
	Millersville, ...	Dec. 7, ...	1	3	22, 61, 184	....	3	90	270	
	Paradise, ...	Dec. 14-15, ...	2	5	65, 425, 55, 110, 450	....	3	221	1,105	
	Maytown, ...	Dec. 16-17, ...	2	5	70, 215, 35, 75, 310	....	3	141	705	5,996
Lawrence, ...	Volant, ...	Jan. 18-19, ...	2	5	60, 75, 150, 100, 400	....	4	157	785	
	New Wilmington, ...	Jan. 20-21, ...	2	6	45, 200, 97, 310, 212, 395	....	4	218	1,309	
	Westfield Church, ...	Jan. 23-24, ...	2	4	95, 212, 105, 125	....	3	110	410	
(Movable Institute School), ...	Little Beaver, ...	Jan. 4-7, ...	4	12	50, 150, 30, 100, 175, 125, 65, 100 325, 350	....	3	140	1,650	4,184
Lebanon, ...	Annville, ...	Jan. 20-21, ...	2	5	90, 85, 42, 185, 210	....	4	102	512	
	Jonestown, ...	Jan. 22-23, ...	2	5	40, 130, 48, 175, 190	....	4	116	583	
	Schaefferstown, ...	Jan. 25-26, ...	2	5	150, 115, 390, 267, 415	....	4	267	1,337	2,432
Lehigh, ...	Laurys, ...	Feb. 15-16, ...	2	5	75, 60, 150, 150, 225	1	4	132	660	
	Pleasant Corner, ...	Feb. 17-18, ...	2	5	125, 75, 150, 150, 250	....	4	150	750	
	Macungie, ...	Feb. 19-20, ...	2	5	100, 75, 150, 150, 200	1	4	135	675	2,085
Luzerne, ...	Town Line, ...	Jan. 4-5, ...	2	5	65, 100, 200, 160, 350	....	3	175	875	
	Lehman, ...	Jan. 6-7, ...	2	5	50, 140, 135, 230	....	3	159	795	
	Orange, ...	Jan. 8-9, ...	2	5	200, 225, 300, 325, 400	....	3	290	1,450	3,120
Lycoming, ...	Hughesville, ...	Feb. 12-13, ...	2	5	160, 250, 265, 400, 375	1	3	290	1,450	
	Jersey Shore, ...	Feb. 15-16, ...	2	5	60, 94, 160, 142, 150	1	3	121	606	
	Limestone, ...	Feb. 17-18, ...	2	5	65, 62, 305, 206, 300	....	3	187	938	2,994
McKean, ...	Smethport, ...	Nov. 27-28, ...	2	5	28, 16, 43, 140, 144	1	4	74	371	
	Port Allegany, ...	Nov. 30-Dec. 1, ..	2	5	52, 40, 168, 110, 198	....	4	114	568	939
Mercer, ...	London, ...	Feb. 17-18, ...	2	5	65, 100, 140, 200, 180	....	4	137	685	
	Stoneboro, ...	Feb. 19-20, ...	2	5	420, 100, 175, 325, 375	....	5	319	1,595	
	Sheakleyville, ...	Feb. 22-23, ...	2	5	115, 220, 82, 125, 225	....	5	159	795	3,078
Mifflin, ...	Lewistown, ...	Jan. 18-19, ...	2	5	150, 130, 360, 400, 500	1	4	308	1,540	....
	Belleville, ...	Nov. 30-Dec. 1, ..	2	5	110, 300, 190, 250, 350, 380	2	3	280	1,680	3,220
Monroe, ...	Sciota, ...	Dec. 2-3, ...	2	5	40, 20, 60, 125, 210	1	3	91	455	
	Broadheadsville, ...	Jan. 20-21, ...	2	6	30, 60, 85, 250, 233	1	4	132	658	
	Kresgeville, ...	Dec. 4-5, ...	2	5	6, 12, 23, 134, 168	1	3	69	343	1,456

Montgomery,	East Greenville,	Jan. 11-12,	2	5	150, 115, 500, 200, 300	....	4	253	1,265	
	Harleysville,	Jan. 13-14,	2	5	75, 110, 260, 325, 400	....	4	222	1,110	
	Schwenksville,	Jan. 15-16,	2	5	100, 100, 225, 200, 300	....	4	185	925	
	Centre Point,	Jan. 18-19,	2	5	125, 125, 225, 250, 500	....	3	245	1,225	
	Trappe,	Jan. 20-21,	2	5	75, 100, 150, 175, 250	....	3	170	850	5,375
Montour (Movable Institute School),	White Hall,	Feb. 1-4,	4	11	70, 80, 75, 110, 125, 100, 125, 485 278, 300	....	3	164	1,808	1,808
Northampton,	Nazareth,	Feb. 1-2,	2	5	80, 75, 125, 200, 225	....	4	141	705	
	Mt. Bethel,	Feb. 3-4,	2	5	100, 125, 225, 300, 600	....	4	270	1,350	
	Cherryville,	Feb. 5-6,	2	5	70, 150, 400, 300, 450	2	4	274	1,370	3,425
Northumberland,	Rebuck,	Feb. 1-2,	2	5	110, 100, 200, 250, 340	....	4	206	1,030	
	Pottsgrove,	Feb. 3-4,	2	5	180, 125, 270, 450, 480	....	4	301	1,505	
	McEwensville,	Feb. 5-6,	2	5	120, 130, 160, 230, 280	....	4	184	920	3,455
Perry (Special),	Newport,	Dec. 11,	1	3	115, 185, 198	4	3	99	495	
	Greenpark,	Dec. 15-16,	2	5	100, 315, 75, 165, 210	2	3	173	865	
	Blain,	Dec. 21-22,	2	5	105, 425, 100, 160, 450	1	3	248	1,240	2,663
Philadelphia,	Philadelphia,	March 5-6,	2	3	60, 175, 150	3	3	128	385	385
Pike,	Paupack,	Jan. 1-2,	2	5	29, 16, 72, 82, 80	1	3	56	279	
	Greentown,	Jan. 4-5,	2	6	32, 75, 112, 450, 425, 500	1	3	267	1,600	
	Egypt Mills,	Feb. 1-2,	2	5	18, 33, 48, 50, 48	1	3	39	197	2,076
Potter,	Coudersport,	Feb. 3-4,	2	5	105, 78, 176, 102, 201	....	4	132	662	
	Germania,	Feb. 5-6,	2	5	75, 50, 225, 160	....	4	127	510	
	Harrison Valley,	Dec. 11,	1	3	60, 11, 114, 122	....	4	77	307	1,479
Schuylkill,	Klingerstown,	Dec. 14-15,	2	5	50, 30, 90, 110, 100	....	4	108	540	
	Barnesville,	Dec. 16-17,	2	5	50, 50, 80, 100, 180	....	4	122	610	
	McKeansburg,	Dec. 18-19,	2	5	40, 40, 100, 300, 150	....	4	194	970	
	Pinegrove,	Dec. 21-22,	2	5	18, 25, 23, 60, 90	....	4	60	301	2,421
Snyder,	Middleburg,	March 5-6,	2	3	160, 220, 340, 320, 375	....	3	283	1,415	
	Mt. Pleasant Mills,	Feb. 10-11,	2	5	180, 150, 340, 320, 380	....	3	274	1,370	2,785
Somerset,	Salisbury,	Dec. 2-3,	2	5	100, 110, 220, 500, 500	....	3	282	1,431	
	Somerset,	Dec. 4-5,	2	6	30, 80, 65, 180, 100, 180	....	4	114	685	
	Stoyestown,	Dec. 7-8,	2	5	50, 80, 80, 160, 200	....	3	114	570	2,556
Sullivan,	Estella,	Feb. 8-9,	2	5	156, 160, 278, 270, 268	1	3	226	1,132	
	Dushore,	Feb. 10-11,	2	5	60, 120, 120, 200, 194	2	3	119	594	1,726
Susquehanna,	Welsh Hill,	Dec. 14-15,	2	5	25, 58, 75, 89, 85	....	3	66	332	
	Gibson Grange,	Dec. 16-17,	2	5	50, 38, 78, 84, 110	....	3	72	360	
	Lawsville,	Dec. 18-19,	2	5	35, 30, 48, 56, 72	....	3	49	246	
	Auburn Center,	Dec. 21-22,	2	5	7, 32, 35, 68, 72	....	3	43	214	1,152
Tioga,	Knoxville,	March 5-6,	2	4	55, 135, 130, 250	....	3	142	570	
	Mitchells Mills,	March 8-9,	2	5	75, 110, 140, 230, 200	....	3	121	755	
	Covington,	March 10-11,	2	5	95, 140, 220, 280, 300	....	3	207	1,035	
	Liberty,	March 12-13,	2	4	210, 220, 500, 525	....	3	364	1,455	
	Wellsboro,	March 15-17,	3	7	300, 400, 110, 650, 1,100, 400, 600	....	3	508	3,560	7,375
Union,	Laurelton,	Jan. 22-23,	2	5	70, 60, 120, 120, 75	....	3	89	445	
	Brook Park,	Jan. 25-26,	2	5	130, 140, 120, 150, 200	....	3	148	740	1,185
Venango,	Utica,	Dec. 21-22,	2	5	75, 38, 110, 72, 78	2	3	75	373	
	Breedtown,	Dec. 23-24,	2	4	25, 90, 50, 112	....	3	69	277	650
Warren (Movable Institute School),	Lottsville,	Jan. 11-14,	4	10	60, 150, 55, 110, 150, 200, 75, 200 250, 275	....	3	156	1,565	
	Sugargrove,	Feb. 26-27,	2	4	65, 80, 95, 102	1	3	85	342	1,907

PENNSYLVANIA FARMERS' INSTITUTES—SEASON OF 1914-15—Continued.

County	Place	Date	Days of institute	Number of sessions	Attendance by Sessions	Speakers Present: Local	Speakers Present: State	Attendance: Average	Attendance: Total	Attendance: By counties
Washington,	Amity,	Nov. 18-19,	2	5	150, 130, 360, 400, 500	1	4	308	1,540	
	Buffalo,	Nov. 20-21,	2	4	63, 160, 25, 140, 315	....	4	141	703	
	Ginger Hill,	Nov. 23-24,	2	5	62, 150, 250, 252	....	4	178	714	
Wayne,	Lookout,	Jan. 6-7,	2	5	84, 42, 102, 148, 100	....	3	95	476	
	Tyler Hill,	Jan. 8-9,	2	5	20, 62, 108, 101, 126	....	3	82	420	
	Calkins,	Jan. 11-12,	2	5	73, 22, 152, 35, 72	....	3	71	357	
	Beech Lake,	Jan. 13-14,	2	5	60, 62, 136, 152, 252	....	3	132	662	1,019
Westmoreland,	Mt. Pleasant,	Nov. 27-28,	2	5	24, 61, 215, 34, 54	....	4	78	388	
	Shearsburg,	Nov. 30-Dec. 1,	2	5	20, 31, 77, 35, 42	1	3	41	205	
	Ligonier,	Dec. 2-3,	2	5	55, 225, 115, 300, 60	1	3	151	755	
	West Fairfield,	Dec. 4-5,	2	4	68, 56, 133, 165	1	3	105	422	1,770
Wyoming,	Tunkhannock,	Feb. 3-4,	2	5	24, 80, 114, 144, 150	1	3	102	512	
	Mahoopany,	Feb. 5-6,	2	5	30, 84, 92, 152, 190	2	4	109	548	1,060
York,	Rossville,	Feb. 8-9,	2	5	98, 445, 45, 285, 475	....	4	263	1,318	
	Dillsburg,	Feb. 10-11,	2	5	320, 850, 125, 600, 850	....	4	549	2,745	
	Manchester,	Feb. 12-13,	2	5	110, 705, 75, 270, 720	....	4	376	1,880	
	Loganville,	Feb. 15-16,	2	5	85, 325, 54, 250, 600	....	4	263	1,314	
	Fawn Grove,	Feb. 17-18,	2	5	315, 550, 130, 380, 480	1	4	375	1,875	
	Red Lion,	Feb. 19-20,	2	5	595, 725, 215, 650, 1,300	1	4	697	3,485	
(Special),	Lewisburg,	Dec. 10,	1	1	450	....	1	450	450	
(Special),	York,	Dec. 11,	1	1	300	....	1	300	300	
(Special),	Spring Grove,	Dec. 12,	1	1	100	....	1	100	100	
(Special),	Stewartstown,	Feb. 10-11,	2	5	325, 410, 376, 482, 734	....	2	465	2,327	15,794
Total,			427	1,125		133	50			183,400

Days of institute,	427
Days of movable institute schools,	29
Total,	456
Number of sessions at institutes,	1,066
Number of sessions at movable schools,	59
Total,	1,125

Speakers present (State),	50
Speakers present (Local),	133
Attendance at institutes,	164,519
Attendance at movable schools,	18,881
Total,	183,400
Harvest home picnics, etc.,	32,600
Grand total,	216,000

CONCLUSION

The report for the season of 1914-1915 shows that at Regular Institutes, Movable Schools and Special Institutes there was an attendance of 183,400. When we consider that during the winter season many parts of the State were visited with snow storms and unprecedented cold weather, this attendance shows the enormous interest taken in the work. All this work has been accomplished at an expenditure of only $22,500.60; and were it not for the work and public spirit of men living in communities where Institutes are held, who devote many days in preparing for the Institutes, this report would have a different showing. No explanation that we can make will exemplify the advantages accruing to agriculture through the agency of Farmers' Institutes and Movable Institute Schools. Our farmers are today meeting the problems confronting them with a courage and determination that can in no manner meet with failure. The Grange, Alliance, Farmers' Clubs, Farm Unions, County Agricultural Societies, Farm Bureaus, etc., are co-operating with our Bureau for the higher development of agriculture, and it behooves us to make special mention of this as well as the valuable service rendered by the members of the State Board of Agriculture who are untiring in their efforts in looking after local arrangements.

Very respectfully,

C. E. CAROTHERS,

Deputy Secretary and Director of Institutes.

THE FOLLOWING IS A LIST OF SPEAKERS AND THEIR ASSIGNMENTS, SEASON OF 1914-1915

H. M. ANDERSON, New Park, York County, Pa.

	Date.	Place.	County.
Jan.	4-5,	Spring Church,	Armstrong.
Jan.	6-7,	Brick Church,	Armstrong.
Jan.	8-9,	Worthington,	Armstrong.
Jan.	11-12,	Eau Claire,	Butler.
Jan.	13-14,	Winfield,	Butler.
Jan.	15-16,	Jacksville,	Butler.
Feb.	1-2,	Rebuck,	Northumberland.
Feb.	3-4,	Pottsgrove,	Northumberland.
Feb.	5-6,	McEwensville,	Northumberland.

C. M. BARNITZ, Riverside, Northumberland County, Pa.

Will attend all meetings in the First Section Nov. 13 to Nov. 25, and the Second Section Feb. 1 to Feb. 20, and March 1 to March 9.

R. U. BLASINGAME, State College, Center County, Pa.

Date.	Place.	County.
Feb. 5-6,	Mehoopany,	Wyoming.
Feb. 10-11,	Dushore,	Sullivan.

M. S. BOND, Danville, Montour County, Pa.

Feb. 22-23,	Linglestown,	Dauphin.
Feb. 24-25,	Halifax,	Dauphin.
Feb. 26-27,	Gratz,	Dauphin.

J. T. CAMPBELL, Hartstown, Crawford County, Pa.

Will attend all meetings in the First Section.

FRED W. CARD, Sylvania, Bradford County, Pa.

Will attend all meetings in the Second Section from Nov. 11 to Dec. 24; Fourth Section, Feb. 1 to Feb. 11, and the Fifth Section Feb. 15 to March 13.

DR. M. E. CONARD, Westgrove, Chester County, Pa.

Will attend all meetings in the first Section Nov. 25 to Dec. 22; Second Section Jan. 20 to Jan. 26; First Section Feb. 12 to March 9 and Movable Institute Schools from Jan. 4 to Feb. 9.

PROF. WELLS W. COOKE, U. S. Dept. of Agriculture, Washington, D. C.

Jan. 4-5,	Little Beaver Grange Hall,	Lawrence.
Jan. 6-7,	Butler,	Butler.
Jan. 8-9,	Westford,	Crawford.
Jan. 11-12,	Lottsville,	Warren.
Jan. 18-19,	Benton,	Columbia.
Feb. 1-2,	White Hall,	Montour.
Feb. 8-9,	McConnellsburg,	Fulton.

W. H. DARST, State College, Center County, Pa.

Jan. 20-21,	Annville,	Lebanon.
Jan. 22-23,	Schaefferstown,	Lebanon.
Jan. 25-26,	Jonestown,	Lebanon.

E. B. DORSETT, Mansfield, Tioga County, Pa.

Will attend all meetings in the Fifth Section.

F. H. FASSETT, Meshoppen, Wyoming County, Pa.

Will attend all meetings in the First Section Nov. 13 to Nov. 25; Fourth Section Nov. 27 to Dec. 22; First Section Feb. 19 to March 9, and Movable Institute Schools Jan. 6 to Feb. 11.

S. L. FAUST, Hoboken, Allegheny County, Pa.

	Date.	Place.	County.
Nov.	13-14,	Rogersville,	Greene.
Nov.	16-17,	Nineveh,	Greene.
Nov.	18-19,	Amity,	Washington.
Nov.	20-21,	Buffalo,	Washington.
Nov.	23-24,	Ginger Hill,	Washington.
Nov.	27-28,	Mt. Pleasant,	Westmoreland.

SHELDON W. FUNK, Boyertown, Berks County, Pa.

Will attend all meetings in the First section Nov. 27 to Dec. 22; Second Section Jan. 4 to Feb. 27, and the Fifth Section March 1 to March 13.

GEO. L. GILLINGHAM, Moorestown, N. J.

Feb.	8-9,	Weatherly,	Carbon.
Feb.	10-11,	Big Creek,	Carbon.
Feb.	12-13,	New Mahoning,	Carbon.
Feb.	15-16,	Laurys,	Lehigh.
Feb.	17-18,	Pleasant Corner,	Lehigh.
Feb.	19-20,	Macungie,	Lehigh.

H. M. GOODERHAM, Patton, Cambria County, Pa.

Will attend all meetings in the Third Section from Feb. 1 to March 9.

J. STUART GROUPE, Jersey Shore, Lycoming County, Pa.

Jan.	4-5,	Hogestown,	Cumberland.
Jan.	6-7,	Oakville,	Cumberland.
Jan.	8-9,	Newburg,	Cumberland.
Jan.	11-12,	Scotland,	Franklin.
Jan.	13-14,	Marion,	Franklin.
Jan.	15-16,	Dry Run,	Franklin.
Jan.	18-19,	Fannettsburg,	Franklin.
Jan.	20-21,	Annville,	Lebanon.
Jan.	22-23,	Schaefferstown,	Lebanon.
Jan.	25-26,	Jonestown,	Lebanon.
Feb.	22-23,	Richlandtown,	Bucks.
Feb.	24-25,	Blooming Glen,	Bucks.
Feb.	26-27,	Doylestown,	Bucks.

J. A. HERMAN, Fombell, Beaver County, Pa.

Jan.	18-19,	Volant,	Lawrence.
Jan.	20-21,	New Wilmington,	Lawrence.
Jan.	22-23,	Westfield Church,	Lawrence.
Feb.	10-11,	East Union,	Allegheny.

J. ALDUS HERR, Lancaster, R. D. No. 4, Lancaster County, Pa.

	Date.	Place.	County.
Nov.	13-14,	Honey Brook,	Chester.
Nov.	17,	Cedarville,	Chester.
Nov.	18-19,	Byers,	Chester.
Nov.	20,	Avondale,	Chester.
Nov.	24,	Doe Run,	Chester.
Jan.	11-12,	East Greenville,	Montgomery.
Jan.	13-14,	Harleysville,	Montgomery.
Jan.	15,	Schwenksville,	Montgomery.
Jan.	19,	Centre Point,	Montgomery.

JOHN D. HERR, Lancaster, Lancaster County, Pa.

Jan.	4-5,	Hogestown,	Cumberland.
Jan.	6-7,	Oakville,	Cumberland.
Jan.	8-9,	Newburg,	Cumberland.
Jan.	11-12,	Scotland,	Franklin.
Jan.	13-14,	Marion,	Franklin.
Jan.	15-16,	Dry Run,	Franklin.
Jan.	18-19,	Fannettsburg,	Franklin.
Jan.	20-21,	Trappe,	Montgomery.

WM. HORROCKS, Souderton, R. D. No. 1, Montgomery County, Pa.

Jan.	20-21,	Trappe,	Montgomery.
Feb.	1-2,	Nazareth,	Northampton.
Feb.	3-4,	Mt. Bethel,	Northampton.
Feb.	5-6,	Cherryville,	Northampton.

C. C. HULSART, Matawan, N. J.

Nov.	16-17,	Tompkinsville,	Lackawanna.
Nov.	18-19,	Bald Mount,	Lackawanna.
Nov.	20-21,	Clarks Summit,	Lackawanna.
Nov.	23-24,	Madisonville,	Lackawanna.
Nov.	27-28,	Daleville,	Lackawanna.
Nov.	30-Dec. 1,	Sciota,	Monroe.
Dec.	2-3,	Brodheadsville,	Monroe.
Dec.	4-5,	Kresgeville,	Monroe.
Dec.	14-15,	Klingerstown,	Schuylkill.
Dec.	16-17,	Barnesville,	Schuylkill.
Dec.	18-19,	McKeansburg,	Schuylkill.
Dec.	21-22,	Pinegrove,	Schuylkill.

F. D. KERN, State College, Centre County, Pa.

Jan.	4-5,	Luthersburg,	Clearfield.

FRANK KLINE, Spring City, Chester County, Pa.

Will attend all meetings in the Fourth Section Nov. 27 to Dec. 8; Fifth Section Jan. 4 to Jan. 19; Third Section Feb. 12 to March 9 and Movable Institute Schools Jan. 20-21-22.

L. W. LIGHTY, East Berlin, Adams County, Pa.

Will attend all meetings in the Second Section.

DR. HANNAH McK. LYONS, Lincoln University, Chester County, Pa.

	Date.	Place.	County.
Nov.	13-14,	Rogersville,	Greene.
Nov.	16-17,	Nineveh,	Greene.
Nov.	18-19,	Amity,	Washington.
Nov.	20-21,	Buffalo,	Washington.
Nov.	23-24,	Ginger Hill,	Washington.
Nov.	27-28,	Mt. Pleasant,	Westmoreland.
Jan.	4-5,	Little Beaver Grange Hall,	Lawrence.
Jan.	6-7,	Butler,	Butler.
Jan.	8-9,	Westford,	Crawford.
Jan.	11,	Eau Claire,	Butler.
Jan.	13-14,	Lottsville,	Warren.
Jan.	18-19,	Lewistown,	Mifflin.
Jan.	21-22,	Benton,	Columbia.
Feb.	2-3,	White Hall,	Montour.
Feb.	9-10,	McConnellsburg,	Fulton.

PROF. T. I. MAIRS, State College, Centre County, Pa.

Jan.	11-12,	Warriors Mark,	Huntingdon.
Jan.	13-14,	Entriken,	Huntingdon.
Jan.	15-16,	Saltillo,	Huntingdon.

M. H. McCALLUM, Wernersville, Berks County, Pa.

Will attend all meetings in the Third Section Nov. 27 to Dec. 24; Fourth Section Jan. 1 to Jan. 23 and the Fifth Section from Feb. 1 to Feb. 13.

PROF. FRANKLIN MENGES, York, York County, Pa.

Will attend all meetings in the Fourth Section.

HOWARD MITMAN, Hellertown, Northampton County, Pa.

Dec.	14-15,	Klingerstown,	Schuylkill.
Dec.	16-17,	Barnesville,	Schuylkill.
Dec.	18-19,	McKeansburg,	Schuylkill.
Dec.	21-22,	Pinegrove,	Schuylkill.

C. E. MYERS, State College, Centre County, Pa.

Feb.	10-11,	East Union,	Allegheny.
Feb.	12-13,	Warrendale,	Allegheny.
Feb.	15-16,	Oakdale,	Allegheny.

CHAS. F. NOLL, State College, Centre County, Pa.

Feb.	22,	Nicktown,	Cambria.
Feb.	23,	Wilmore,	Cambria.
Feb.	24-25,	Salix,	Cambria.
Feb.	26-27,	Homer City,	Indiana.

C. R. ORTON, State College, Centre County, Pa.

	Date.	Place.	County.
Nov.	20-21,	Friends Cove,	Bedford.
Dec.	4-5,	Somerset,	Somerset.
Dec.	18-19,	Phillipsburg,	Centre.

W. M. PATTON, Mosgrove, R. D. No. 2, Armstrong County, Pa.

Will attend all meetings in the Fourth Section Jan. 1 to Jan. 16; First Section Feb. 1 to Feb. 11, and the Second Section March 1 to March 9.

E. L. PHILLIPS, New Bethlehem, R. D. No. 2, Clarion County, Pa.

Will attend all meetings in the Second Section Nov. 11 to Dec. 24; Third Section Jan. 4 to Jan. 23, and the Fourth Section Feb. 1 to Feb. 11.

DR. W. T. PHILLIPY, Carlisle, Cumberland County, Pa.

Feb.	12-13,	Bald Eagle Furnace,	Blair.
Feb.	15-16,	Geeseytown,	Blair.
Feb.	17-18,	Martinsburg,	Blair.

F. S. PUTNEY, State College, Centre County, Pa.

Nov.	13-14,	Rogersville,	Greene.
Nov.	16-17,	Nineveh,	Greene.
Nov.	18-19,	Amity,	Washington.
Nov.	20-21,	Buffalo,	Washington.

PROF. HELMER RABILD, U. S. Department of Agriculture, Washington, D. C.

Nov.	13-14,	Honey Brook,	Chester.
Nov.	16-17,	Cedarville,	Chester.
Nov.	18-19,	Byers,	Chester.
Nov.	20,	Avondale,	Chester.
Nov.	23-24,	Doe Run,	Montgomery.
Jan.	15-16,	Schwenksville,	Montgomery.
Jan.	18-19,	Centre Point,	Tioga.
March	5-6,	Knoxville,	Tioga.
March	8-9,	Mitchells Mills,	Tioga.
March	10-11,	Covington,	Tioga.
March	12-13,	Liberty,	Tioga.
Mar.	15-16-17,	Wellsboro,	Tioga.

CHAS. A. ROW, Yardley, Bucks County, Pa.

Nov.	30-Dec. 1,	Sciota,	Monroe.
Dec.	2-3,	Brodheadsville,	Monroe.
Dec.	4-5,	Kresgeville,	Monroe.
Feb.	8-9,	Weatherly,	Carbon.
Feb.	10-11,	Big Creek,	Carbon.
Feb.	12-13,	New Mahoning,	Carbon.

ROBT S. SEEDS, Birmingham, Huntingdon County, Pa.

	Date.	Place.	County.
Jan.	4-5,	Hogestown,	Cumberland.
Jan.	6,	Little Beaver Grange Hall,	Lawrence.
Jan.	7,	Butler,	Armstrong.
Jan.	8-9,	Worthington,	Butler.
Jan.	11,	Westford,	Crawford.
Jan.	12,	Lottsvile,	Warren.
Jan.	13-14,	Winfield,	Butler.
Jan.	15-16,	Jacksville,	Butler.
Jan.	18-19,	Volant,	Lawrence.
Jan.	20,	New Wilmington,	Lawrence.
Jan.	22,	Benton,	Columbia.
Jan.	23,	Laurelton,	Union.

RAYMOND S. SMITH, State College, Centre County, Pa.

Jan.	4-5,	Luthersburg	Clearfield.
Jan.	6-7,	Curwensville,	Clearfield.
Jan.	8-9,	Mt. Joy,	Clearfield.

W. H. STOUT, Pinegrove, Schuylkill County, Pa.

March	1-2,	Temple,	Berks.
March	3-4,	Centreport,	Berks.
March	5-6,	Bally,	Berks.
March	8-9,	Geigertown,	Berks.

VERN T. STRUBLE, Athens, R. D. No. 24, Bradford County, Pa.

Jan.	20-21,	Annville,	Lebanon.
Jan.	22-23,	Schaefferstown,	Lebanon.
Jan.	25-26,	Jonestown,	Lebanon.
Feb.	1-2,	East Berlin,	Adams.
Feb.	3-4,	Bendersville,	Adams.
Feb.	5-6,	Hunterstown,	Adams.
Feb.	8-9,	Rossville,	York.
Feb.	10-11,	Dillsburg,	York.
Feb.	12-13,	Manchester,	York.
Feb.	15-16,	Loganville,	York.
Feb.	17-18,	Fawn Grove,	York.

PROF. W. H. TOMHAVE, State College, Centre County, Pa.

Jan.	8-9,	Westford,	Crawford.
Jan.	18-19,	Benton,	Columbia.
Feb.	18,	Pleasant Corner,	Lehigh.
Feb.	19,	Macungie,	Lehigh.

LEON OTICE VAN NOY, Troy, R. D. No. 66, Bradford County, Pa.

Will attend all meetings in the Fourth Section Nov. 13 to Dec. 22; Jan. 18 to Jan. 23; Feb. 12 to March 4 and the Third Section Feb. 1 to Feb. 9.

D. H. Watts, Kerrmoor, Clearfield County, Pa.

Will attend all meetings in the Third Section.

JNO. W. WHITE, State College, Centre County, Pa.

	Date.	Place.	County.
Feb.	1-2,	Salem,	Clarion.
Feb.	3-4,	Greenville,	Clarion.
Feb.	5-6,	Sligo,	Clarion.

W. R. WHITE, State College, Centre County, Pa.

Jan.	4-5,	Town Line,	Luzerne.
Jan.	6-7,	Lehman Grange Hall,	Luzerne.
Jan.	8-9,	Orange,	Luzerne.

W. THEO WITTMAN, Allentown, Lehigh County, Pa.

Will attend all meetings in the Fifth Section Nov. 16 to No. 28; Third Section Nov. 30 to Dec. 24; Feb. 1-2 Nazareth, Feb. 5-6, Hunterstown, Feb. 8-9 Rossville, Fourth Section Feb. 12 to March 17, and Movable Institute Schools Jan. 6 to Feb. 10, excepting Jan. 20-21-22.

E. L. WORTHEN, State College, Centre County, Pa.

Nov.	30-Dec. 1,	Sciota,	Monroe.
Dec.	2-3,	Brodheadsville,	Monroe.
Dec.	4-5,	Kresgeville,	Monroe.

PAUL I. WRIGLEY, Eddington, Bucks County, Pa.

Dec.	14-15,	Klingerstown,	Schuylkill.
Dec.	16-17,	Barnesville,	Schuylkill.
Dec.	18-19,	McKeansburg,	Schuylkill.
Dec.	21-22,	Pinegrove,	Schuylkill.

DEPARTMENT LECTURERS

In so far as time and circumstances will permit, the officers of the Department of Agriculture are desirous of engaging in Institute work.

In order to prevent disappointment in the arrangement of programs, it is recommended that Institute Managers first consult the individual whose services they may wish to secure, before placing his name on the program.

Department lecturers come to these Institutes free of charge, except that they are to be taken from and to the railroad station at the expense of local managers. The topics which they will discuss can be procured by addressing the following officers of the Department of Agriculture:

HON. N. B. CRITCHFIELD, Secretary of Agriculture.
HON. A. L. MARTIN, Deputy Secretary and Director of Institutes.
JAMES FOUST, Dairy and Food Commissioner.
PROF. H. A. SURFACE, Economic Zoologist.
DR. C. J. MARSHALL, State Veterinarian.

AGRICULTURAL SOCIETIES

There is quite an improvement to be noted in the manner of conducting the various agricultural societies of the State by the eliminating of objectionable side-shows, games of chance and various gambling devices. Increased interest and prominence has been given to the encouragement of strictly agricultural exhibits. At many of the Fairs our Department rendered the service of our Farm Advisory corps by furnishing judges for livestock, poultry, horticulture and other agricultural exhibits. There appears to be a growing necessity in Pennsylvania for the holding of a State Agricultural Fair, to be held under State control, at which the various farm organizations of the State and County Agricultural Societies should have a fair representation. When this desirable end is accomplished, the local agricultural societies will be enabled to make exhibits at the State Fair which, in a high degree, would represent the best agricultural products of the various counties of the State. All of which would form an object lesson that would unquestionably give encouragement to the growing of farm crops year by year of a high degree of excellence.

The attendance for 1914 was 1,808,722, as compared with the previous year, 1,776,600, shows an increase of 32,122; total membership 15,442; amount received from State fund, $50,382.08; amount paid in premiums, 1914, $112,351.78; amount offered in premiums, 1915, $158,126.42, an increase of $45,774.64.

List of County and Local Agricultural Societies, with Names and Addresses of Presidents and Secretaries and Dates for Holding Fall Exhibitions for 1915, Etc.

County.	Corporate Name of Society.	Name and Address of President.	Name and Address of Secretary.
	State Horticultural Association of Pennsylvania,	Chester J. Tyson, Floradale,	J. A. Runk, Huntingdon.
Adams,	Fruit Growers' Association of Adams County,	C. Arthur Griest, Guernsey,	Edwin C. Tyson, Floradale.
Adams,	Biglerville Agricultural, Horticultural and Poultry Asso.,		O. C. Rice, Biglerville.
Allegheny,	Allegheny County Agricultural Association,	C. B. Burns, Imperial,	C. B. Burns, Imperial.
Armstrong,	Kiskiminetas Valley Agricultural and Driving Association,	L. Todd Owens, Apollo,	C. J. Dickie, Vandergrift.
Armstrong,	Dayton Agricultural and Mechanical Association,	A. K. Good, Dayton,	C. C. Cochran, Dayton.
Beaver,	Beaver County Agricultural Association,	Dr. J. S. Louthan, Beaver Falls,	M. J. Patterson, Beaver.
Bedford,	Bedford County Agricultural Association,	Dr. S. F. Statler, Bedford,	J. Roy Cessna, Bedford.
Bedford,	Grangers Picnic Association,	C. H. Oster, Osterburg,	Geo. W. Oster, Osterburg.
Berks,	Kutztown Fair Association,	Chas. D. Herman, Kutztown,	G. C. Bordner, Kutztown.
Berks,	Agricultural and Horticultural Association of Berks County,	James P. Hennessy, Reading,	D. J. McDermott, Reading.
Blair,	Blair County Grange Fair Association,	Dr. W. Frank Beck, Altoona,	H. S. Wertz, Duncansville.
Bradford,	Bradford County Agricultural Society,	W. W. Jennings, Towanda,	Thos. W. Piollet, Wysox.
Bradford,	Troy Agricultural Society,	J. W. Pomeroy, Troy,	W. S. Montgomery, Troy.
Bucks,	Bucks County Agricultural Society,	W. Elmer Savacool, Benjamin,	I. Y. Baringer, Perkasie.
Bucks,	Farmers' Picnic Association of Quakertown,	Harry S. Johnson, Quakertown,	Jacob M. Landis, Quakertown.
Butler,	Butler Driving Park and Fair Association,	G. A. Schaffner, Butler,	W. B. Purvis, Butler.
Cambria,	Cambria County Agricultural Association,	M. J. Farabaugh, Carrolltown,	J. V. Maucher, M. D., Carrolltown.
Cameron,	Cameron County Agricultural Association,	F. X. Blumle, Emporium,	Harold Seger, Emporium.
Carbon,	Carbon County Industrial Society,	O. F. Acker, Lehighton,	J. Albert Durling, Lehighton.
Centre,	Patrons of Husbandry Encampment and Fair Association,	Leonard Rhone, Centre Hall,	Leonard Rhone, Centre Hall.
Chester,	Oxford Agricultural Association,	A. F. Wheeler, Oxford,	Thos. F. Grier, Oxford.
Chester,	Chester County Agricultural Association,	David M. Golden, West Chester,	Fred DuRose, Reid, West Chester.
Clarion,	Clarion County Fair Association,	B. W. Thompson, Clarion,	B. H. Frampton, Clarion.
Clearfield,	Clearfield County Agricultural Society,	Curtis Read, Clearfield,	W E.. Davis, Clearfield.
Clearfield,	DuBois Driving and Agricultural Association,	M. M. McCreight, DuBois,	J. A. Slaugenhoupt, DuBois.
Columbia,	Columbia County Agricultural, Hort. and Mechanical Asso.,	A. R. Heric, Mifflinville,	Harry B. Correll, Bloomsburg.
Crawford,	Conneaut Lake Agricultural Association,	H. O. Holcomb, Conneaut Lake,	Chas. T. Byers, Conneaut Lake.
Crawford,	Oil Creek Agricultural Fair Association,	J. B. Pasterius, Titusville,	Allen D. Cooper, Titusville.
Cumberland,	Grangers Interstate Picnic Exhibition Association,	R. H. Thomas, Jr., Mechanicsburg,	R. H. Thomas, 3d, Mechanicsburg.
Cumberland,	Cumberland County Agricultural Society,	Abram Bosler, Carlisle,	W. H. McCrea, Carlisle.
Dauphin,	Middletown Fair Association,	A. L. Erb, Middletown,	F. B. Stayman, Middletown.
Dauphin,	Gratz Agricultural and Horticultural Association,	Prof. Harry Smith, Gratz,	Guy R. Klinger, Gratz.
Delaware,	Delaware Agricultural Society,	Thomas Wittkorn, Media,	J. M. Rogers, Wallingford, R. D. 1.
Elk,	Elk County Agricultural Fair Association,	H. J. Gregory, St. Marys,	E. J. C. Grotzinger, St. Marys.
Erie,	Wattsburg Agricultural Society,	I. B. Munsee, Wattsburg,	J. F. Dearing, Wattsburg.
Erie,	Corry Fair and Driving Park Association,	D. Warren DeRosay, Corry,	Wake Morgaridge, Corry.
Greene,	Greene County Agricultural and Manufacturing Society,	N. M. Biddle, Carmichaels,	C. J. Lincoln, Carmichaels.
Indiana,	Indiana County Agricultural Society,	M. F. Jamison, Indiana,	David Blair, Indiana.
Jefferson,	Jefferson County Agricultural and Driving Park Association,		
Jefferson,	Punxsutawney Fair Association,	Dr. G. W. Means, Punxsutawney,	Joseph M. Williams, Punxsutawney.
Juniata,	Juniata County Agricultural Society,	J. Holmes Book, Port Royal,	James N. Groninger, Port Royal.

Lackawanna,	**Lackawanna County Fair and Grange Poultry Association,**	**J. F. Lacoe, Ransom,**	**F. L. Thompson, Clarks Summit.**
Lancaster,	Lancaster County Agricultural Fair Association,	P. T. Watt, Lancaster,	J. F. Seldomridge, Lancaster.
Lawrence,	Lawrence County Agricultural Association,	K. C. Hayes, Pulaski,	J. P. Buckanan, Pulaski.
Lebanon,	Lebanon Valley Fair Association,	W. H. Bollman, Lebanon,	J. A. Bollman, Lebanon.
Lebanon,	Lebanon County Agricultural and Horticultural Association,	Edgar A. Weimer, Lebanon,	**S. P. Heilman, M. D., Lebanon.**
Lehigh,	Lehigh County Agricultural Society,	**Dr. V. H. Wieand, Allentown,**	Harry B. Schall, Allentown.
Lycoming,	Lycoming County Fair Association,	Thos. A. Boak, Hughesville,	Edw. E. Frontz, Hughesville.
McKean,	McKean County Fair Association,	**E. A. Studholme, Smethport,**	**H. J. Rice, Smethport.**
Mercer,	Mercer County Agricultural Association,	S. L. Egbert, Mercer,	Geo. H. Fowler, Stoneboro.
Mercer,	Mercer Central Agricultural Society,	**John P. Orr, Mercer,**	Robt. M. Gilkey, Mercer.
Monroe,	Monroe County Agricultural Society,	Jesse Ransberry, East Stroudsburg,	**W. M. Burnett, Stroudsburg.**
Montgomery,	Montgomery Fair Association,	David Hoag, Pottstown,	**C. M. Shaner, Pottstown.**
Northampton,	Northampton County Agricultural Society,	Wm. K. Shimer, Nazareth,	J. R. Reinheimer, Nazareth.
Northumberland,	**Milton Fair and Northumberland County Agri.** Association,	John J. Kelly, Milton,	**Joseph H. Johnson, Milton.**
Perry,	Perry County Agricultural Society,	T. H. Butturf, Newport,	**J. C. F. Stephens, Newport.**
Philadelphia,	Pennsylvania Horticultural Society,	C. Hartman Kuhn, Franklin National Bank Bldg., Philadelphia.	David Rust, Horticultural Hall, Philadelphia.
Somerset,	Somerset County Agricultural Society,	Edward Hoover, Somerset,	John S. Miller, Somerset.
Sullivan,	**Sullivan County Agricultural Society,**	S. B. Kilmer, Dushore,	O. N. Molyneux, Dushore.
Susquehanna,	Susquehanna County Agricultural Society,	F. A. Davies, Montrose,	W. G. Comstock, Montrose.
Susquehanna,	Harford Agricultural Society,	W. C. Wescott, Harford,	O. F. Maynard, Harford.
Susquehanna,	Lawton Agricultural Society,	Isaiah Haire, Lawton,	S. C. Birchard, Birchardville.
Tioga,	Cowanesque Valley Agricultural Society,	G. H. Rumsey, Westfield,	J. W. Smith, Westfield.
Tioga,	Smythe Park Association,	John F. Pitts, Elmira, N. Y.,	F. H. Marvin, Mansfield.
Union,	Union County Agricultural Society,	F. W. Getz, Lewisburg,	**C. Dale Wolfe, Lewisburg.**
Washington,	**Sandy Plains Fair Association,**	Wm. Allen, Fayette City,	**B. Frank Emery, Millsboro.**
Washington,	Washington Fair Association,	**H. S. Grayson, Washington,**	**W. H. Davis, Washington.**
Warren,	**Warren County Farmers' and Breeders'** Association,	**D. B. Hitchcock, Russell,**	R. J. Weld, Sugargrove.
Warren,	**Warren County Agricultural Association,**	Clyde G. Smith, Warren,	Hugh V. Hazeltine, Warren.
Westmoreland,	Westmoreland Fair Association,	John W. Ruth, Scottdale,	**W. F. Holtzer, Greensburg.**
Wyoming,	**Wyoming County Fair Association,**	**S. R. Brunges, Tunkhannock,**	**O. D. Stark, Tunkhannock.**
York,	**York County Agricultural Society,**	**John H. Wogan, York,**	Henry C. Heckert, York.
York,	Hanover Agricultural Society,	C. J. Dalene, Hanover,	S. A. Geiselman, Hanover.
York,	New Freedom Farmers' Improvement **Association,**	**W. J. McCullough, New Freedom,**	**M. F. Zeigler, New Freedom.**
York,	Pen-Mar **County Agricultural Association,**	M. E. Smith, New Park,	Thos. W. Brown, Fawn Grove

List of County and Local Agricultural Societies, with Names and Addresses of Presidents and Secretaries and Dates for Holding Fall Exhibitions for 1915, Etc.—Continued.

County.	Corporate Name of Society.	Attendance, 1914.	Race track.	Membership.	Amount received from State fund.	Premiums.		Held 1915.	
						Paid, 1914.	Offered, 1915.	Place.	Date.
	State Horticultural Asso. of Pennsylvania,	300	....	350	....	....	....	**Reading,**	Jan. 17-22 (1916.)
Adams, ...	Fruit Growers' Asso. of Adams County, ...	....	....	220	....	....	....	Bendersville.	Dec. 15-17.
Adams, ...	Biglerville Agricultural, Horticultural and Poultry Association.	10,000	½ mile	165	$500 00	$700 00	$385 00	Gettysburg, ...	Dec. 29-31.
Allegheny, ...	Allegheny County Agricultural Association,	11,000	½ mile	135	287 98	500 00	1,000 00	Imperial, ...	Oct. 5-7.
Armstrong, ...	Dayton Agricultural and Mechanical Asso.,	20,000	½ mile	282	411 10	1,371 25	2,500 00	Dayton, ...	Sept. 21-24.
Armstrong, ...	Kiskiminetas Valley Agri. and Driving Association.	15,000	½ mile	200	1,000 00	1,100 00	2,000 00	Apollo, ...	Sept. 1-4.
Beaver, ...	Beaver County Agricultural Association, ..	26,000	½ mile	380	1,000 00	1,465 85	4,500 00	Junction Park, ...	Sept. 15-18.
Bedford, ...	Bedford County Agricultural Society, ...	8,000	½ mile	725	1,000 00	1,273 15	1,500 00	Bedford, ...	Oct. 5-8.
Bedford, ...	Grangers Picnic Association, ...	40,000	....	....	....	....	....	Osterburg, ...	Aug. 17-20.
Berks, ...	Kutztown Fair Association, ...	40,000	½ mile	576	1,000 00	1,100 00	2,500 00	Kutztown, ...	Aug. 24-27.
Berks, ...	Agri. and Hort. Asso. of Berks County, ...	70,000	½ mile	1,100	1,000 00	1,187 06	2,000 00	Reading, ...	Sept. 14-17.
Blair, ...	Blair County Grange Fair Association, ...	50,000	½ mile	15	1,000 00	1,113 50	2,000 00	Hollidaysburg, ...	Sept. 28-Oct. 1.
Bradford, ...	Bradford County Agricultural Society, ...	12,000	½ mile	372	687 00	1,223 90	5,000 00	Towanda, ...	Sept. 8-10.
Bradford, ...	Troy Agricultural Society, ...	13,000	½ mile	3	547 00	1,023 80	1,800 00	Troy, ...	Aug. 31-Sept. 3.
Bucks, ...	Bucks County Agricultural Society, ...	8,832	....	16	1,000 00	800 00	1,224 08	Perkasie, ...	Sept. 15-18.
Bucks, ...	Farmers' Picnic Asso. of Quakertown, ...	10,000	½ mile	100	....	500 00	500 00	Quakertown, ...	Sept. 3-4.
Butler, ...	Butler Driving Park and Fair Association,	50,000	½ mile	....	1,000 00	1,790 50	2,500 00	Butler, ...	Aug. 21-27.
Cambria, ...	Cambria County Agricultural Association, ..	10,000	½ mile	381	857 25	857 25	2,500 00	Carrolltown, ...	Aug. 31-Sept. 3.
Cameron, ...	Cameron County Agricultural Association,	3,000	....	....	587 50	587 50	1,369 50	Emporium, ...	Sept. 14-17.
Carbon, ...	Carbon County Industrial Society, ...	20,000	½ mile	40	1,000 00	1,057 42	1,500 00	Lehighton, ...	Sept. 28-Oct. 1.
Centre, ...	Patrons of Husbandry Encampment and Fair Association.	15,000	½ mile	1,500	287 00	287 00	500 00	Centre Hall, ...	Sept. 11-17.
Chester, ...	Chester County Agricultural Association, ..	11,000	½ mile	210	1,000 00	3,500 00	4,080 00	West Chester, ...	Sept. 14-17.
Chester, ...	Oxford Agricultural Association, ...	14,000	½ mile	5	1,000 00	1,452 69	1,500 00	Oxford, ...	Sept. 22-24.
Clarion, ...	Clarion County Fair Association, ...	12,000	½ mile	277	1,000 00	1,207 00	1,500 00	Clarion, ...	Sept. 7-10.
Clearfield, ...	Clearfield County Agricultural Society.	....	½ mile	256	....	....	....	Clearfield, ...	Not decided.
Clearfield, ...	DuBois Driving and Agricultural Asso., ..	12,000	½ mile	95	1,000 00	3,000 00	3,600 00	DuBois, ...	Sept. 28-Oct. 1.
Columbia, ...	Columbia County Agricultural, Horticultural and Mechanical Association.	35,000	½ mile	653	1,000 00	7,245 77	8,000 00	Bloomsburg, ...	Oct. 5-8.

Crawford,	Conneaut Lake Agricultural Association,	....	....	....	....	....	....	Exposition Park,	Not decided.
Crawford,	Oil Creek Agricultural Fair Association,	25,000	½ mile	300	1,000 00	2,000 00	3,000 00	Titusville,	Sept. 7-10.
Cumberland,	Grangers Interstate Picnic Exhibition Asso.,	100,000	....	....	....	....	....	Williams Grove,	Aug. 30-Sept. 4.
Cumberland,	Agricultural Society of Cumberland County,	25,000	½ mile	65	1,000 00	1,000 00	2,700 00	Carlisle,	Sept. 21-24.
Dauphin,	Middletown Fair Association,	15,000	½ mile	231	1,000 00	1,418 00	2,500 00	Middletown,	Aug. 24-27.
Dauphin,	Gratz Agricultural and Hort. Association,	10,000	½ mile	39	941 00	1,016 00	2,000 00	Gratz,	Oct. 12-15
Delaware,	Delaware Agricultural Society,	....	....	100	....	300 00	1,000 00	Media,	Not decided.
Elk,	Elk County Agricultural Fair Asso.,	10,000	½ mile	20	180 00	410 00	1,200 00	St. Marys,	Oct. 5-9.
Erie,	Wattsburg Agricultural Society,	5,000	½ mile	200	722 20	830 47	1,000 00	Wattsburg,	Sept. 7-10.
Erie,	Corry Fair and Driving Park Association,	20,000	½ mile	85	1,000 00	2,210 12	2,500 00	Corry,	Not decided.
Greene,	Greene County Agri. and M'f'g. Society,	3,000	½ mile	97	631 90	795 70	1,000 00	Carmichaels,	Sept. 21-24.
Indiana,	Indiana County Agricultural Society,	10,000	½ mile	....	1,000 00	5,000 00	5,000 00	Indiana,	Sept. 7-10.
Jefferson,	Jefferson County Agri. Society and Driving Park Association.	....	½ mile	....	....	....	....	Brookville,	Aug. 31-Sept. 3.
Jefferson,	Punxsutawney Fair Association,	20,000	½ mile	125	1,000 00	1,000 00	2,500 00	Punxsutawney,	Sept. 15-18.
Juniata,	Juniata County Agricultural Society,	25,000	½ mile	113	1,000 00	1,000 00	1,000 00	Port Royal,	Sept. 14-17.
Lackawanna,	Lackawanna County Fair and Grange,	15,000	½ mile	81	952 20	952 20	1,000 00	Clarks Summit,	Sept. 28-Oct. 1.
Lancaster,	Lancaster County Agri. Fair Association,	62,500	½ mile	162	1,000 00	4,279 33	6,500 00	Lancaster,	Sept. 28-Oct. 1.
Lawrence,	Lawrence County Agricultural Association,	15,000	½ mile	75	1,000 00	1,500 00	2,000 00	Pulaski,	Sept. 21-24.
Lebanon,	Lebanon Valley Fair Association,	60,000	½ mile	80	1,100 00	1,084 00	1,500 00	Lebanon,	Aug. 17-20.
Lebanon,	Lebanon County Agri. and Hort. Asso.,	5,000	....	200	....	....	....	Lebanon,	Nov. 5-6.
Lehigh,	Lehigh County Agricultural Society,	200,000	½ mile	807	1,000 00	17,000 00	18,000 00	Allentown,	Sept. 21-24.
Lycoming,	Lycoming County Fair Association,	3,000	½ mile	145	1,000 00	1,658 75	1,500 00	Hughesville,	Oct. 12-15.
McKean,	McKean County Fair Association,	6,500	½ mile	84	1,000 00	1,321 36	5,000 00	Smethport,	Sept. 14-17.
Mercer,	Mercer County Agricultural Association,	25,000	½ mile	280	1,000 00	2,400 00	4,000 00	Stoneboro,	Sept. 27-30.
Mercer,	Mercer Central Agricultural Society,	30,000	½ mile	....	1,000 00	2,400 00	2,500 00	Mercer,	Sept. 14-16.
Monroe,	Monroe County Agricultural Society,	20,000	½ mile	15	1,000 00	1,074 00	2,500 00	Stroudsburg,	Sept. 6-10.
Montgomery,	Montgomery Fair Association,	22,000	1 mile	18	427 00	1,100 00	1,500 00	Pottstown,	Aug. 31-Sept. 3.
Northampton,	Northampton County Agricultural Society,	50,000	½ mile	325	1,000 00	1,545 41	3,000 00	Nazareth,	Sept. 14-17.
Northumberland,	Milton Fair and Northumberland County Agricultural Association.	15,000	½ mile	92	1,000 00	1,100 00	1,500 00	Milton,	Sept. 28-Oct. 1.
Perry,	Perry County Agricultural Society,	18,000	½ mile	311	1,000 00	1,068 93	1,034 00	Newport,	Oct. 12-15.
Philadelphia,	Pennsylvania Horticultural Society,	....	....	870	....	2,600 00	2,800 00	Philadelphia,	Nov. 9-12.
Somerset,	Somerset County Agricultural Society,	2,500	½ mile	250	1,000 00	977 40	1,000 00	Somerset,	Sept. 28-Oct. 1.
Sullivan,	Sullivan County Agricultural Society,	3,000	½ mile	59	561 50	761 95	800 00	Forksville,	Sept. 28-30.
Susquehanna,	Susquehanna County Agricultural Society,	5,000	½ mile	72	109 00	705 80	850 00	Montrose,	Sept. 14-16.
Susquehanna,	Harford Agricultural Society,	1,200	....	109	745 25	757 77	1,250 00	Harford,	Sept. 7-9.
Susquehanna,	Lawton Agricultural Society,	2,500	....	20	....	283 00	320 00	Lawton,	Sept. 1-2.
Tioga,	Cowanesque Valley Agricultural Society,	12,000	½ mile	26	1,000 00	1,246 00	4,000 00	Westfield,	Sept. 7-10.
Tioga,	Smythe Park Association,	10,000	½ mile	51	1,000 00	2,161 35	2,363 84	Mansfield,	Sept. 14-17.
Union,	Union County Agricultural Society,	15,000	½ mile	162	1,000 00	1,213 70	1,500 00	Lewisburg,	Oct. 12-15.
Washington,	Sandy Plains Fair Association,	5,000	½ mile	....	....	2,300 00	2,300 00	Millsboro,	July 27-29.
Washington,	Washington Fair Association,	10,000	½ mile	....	1,000 00	2,500 00	2,500 00	Arden,	Aug. 31-Sept. 3.
Warren,	Warren County Farmers' and Breeders' Association.	....	....	30	50 00	....	....	....	....
Warren,	Warren County Agricultural Association,	....	½ mile	....	....	....	1,500 00	Warren,	Aug. 31-Sept. 3.
Westmoreland,	Westmoreland County Fair Association,	16,000	½ mile	16	1,000 00	1,368 25	1,500 00	Youngwood,	Sept. 7-11.
Wyoming,	Wyoming County Fair Association,	16,000	½ mile	120	1,000 00	1,061 15	1,500 00	Tunkhannock,	Sept. 21-24.
York,	York County Agricultural Society,	180,000	½ mile	250	....	4,100 00	5,000 00	York,	Oct. 4-8.
York,	Hanover Agricultural Society,	25,000	½ mile	....	....	....	....	Hanover,	Sept. 14-17.
York,	New Freedom Farmers' Improvement Asso.,	12,000	....	140	141 55	541 55	600 00	New Freedom,	Sept. 22-24.
York,	Pen Mar County Agricultural Association,	10,000	½ mile	68	357 65	615 00	600 00	Fawn Grove,	Aug. 11-13.
	Total,	1,830,722	....	15,560	$50,809 08	$114,151 78	$161,626 42	....	

REPORT OF THE DAIRY AND FOOD BUREAU

Harrisburg, Pa., December 31, 1915.

Hon. Chas. E. Patton, Secretary of Agriculture:

Dear Sir: I have the honor to submit herewith a report of the Dairy and Food Bureau of the Department of Agriculture, for the year ending December 31, 1915. It covers the operations for the year and contains some details that may be useful for public information.

THE PENNSYLVANIA FOOD LAWS

In the paragraphs introductory to my preliminary report for the year 1914, I presented a list of the fifteen laws, then in force, for the enforcement of which this Bureau was held responsible. These laws were of three classes:

First. A General Food Law providing against the adulteration and misbranding of foods in general.

Second. Special food laws making particular provisions covering the sale of milk, cream, cheese, renovated butter, oleomargarine, ice cream, fresh meat, poultry, game and fish, lard, sausage, fresh eggs, vinegar, fruit syrups and non-alcoholic drinks.

Third. A Cold Storage Law covering the operations of cold storage warehouses, the storage of certain foods therein, and the sale of these foods after such storage.

The Legislature of 1915 has but slightly modified the body of laws above referred to. The Act of June 8, 1911 established a minimum standard of milk of three and one-fourth per cent butter-fat and twelve per cent. of milk solids, but an amendment dated June 2, 1915, has further provided that, in cases where the butter-fat content of milk is not below three per centum and the milk is otherwise pure and wholesome, the Dairy and Food Commissioner shall not institute legal proceedings against the producer or vendor of the milk in question if said producer or vendor shall furnish a satisfactory affidavit that nothing has been added to or taken from said milk.

The Act dated May 5, 1915, regulating the sale of chicory mixed with coffee has been added to the list of the laws with whose enforcement this Bureau is charged.

RELATION OF THE DAIRY AND FOOD BUREAU TO THE DEPARTMENT OF AGRICULTURE

The first step in the history of this Bureau was taken by the dairymen and farmers of the State when, at their urging, the Legislature created the office of Dairy and Food Commissioner and made it a branch of the service with which the State Board of Agriculture was charged. Prior to that time, there had been several laws upon the statute books regulating the sale of oleomargarine and providing against the adulteration of cider vinegar and the sale as such of various artificial substitutes for this orchard product. These early laws had comparatively little effect in preventing the abuses they were designed to correct, largely because there was no executive officer made specifically responsible for their enforcement. It was the aim of the farmers and dairymen to have the office conducted by a man familiar with the farming and dairying industries and in touch with the methods and conditions of these industries. The first Dairy and Food Commissioner was the Honorable Eastburn Reeder, who was appointed by the President of the State Board of Agriculture in 1893.

When, in 1895, the Department of Agriculture was created at the desire of the farmers of the State to furnish an agency more compact and capable of closer co-ordination with the other executive officers of the State than was possible in the case of a body so large as the State Board of Agriculture, the office of the Dairy and Food Commissioner was made subordinate to that of the Secretary of Agriculture, and the Dairy and Food Bureau was created as one of the major divisions of the Department of Agriculture. Honorable Levi P. Wells was the first Dairy and Food Commissioner appointed by the Governor under the reorganization. The farming and dairying industries of the State have continued to maintain a deep interest in the work of this Bureau, have co-operated with it in its endeavors to secure a betterment of the food sale conditions, and clearly regard it as chiefly an agency for the safeguarding of important farm industries. Every branch of the State service presents a variety of relations and aspects, and there are frequent differences in opinion as to which of these should be regarded as that upon which the organization relations of the agency should chiefly be based. Such differences of opinion have been expressed with regard to this Bureau; but it is respectfully urged that, in view of the history of this branch of the State service, any change in its departmental relationship would be regarded by the farmers of the State as divesting them very largely of the values which they strove to gain in securing the creation of this Bureau in the Department of Agriculture.

DESIRABILITY OF EXTENSION OF PRESENT FOOD LAWS

It will be shown in later parts of this report that, since the first enactment of the General Food Law of 1895, a very radical improvement in the condition as to freedom from adulteration of the foods sold in Pennsylvania markets has taken place. The addition of undesirable preservatives and of deceptive and possibly injurious colorings has largely disappeared. The label descriptions of foods are less frequently deceptive. The sale of imitations and substitutes is, with rare exceptions, made under properly distinguishing names and label statements. The chief point of criticism remaining, relates to the conditions of production, transport, handling, exposing for sale, and delivering to consumers of the various food products, and to the occasional use of raw and partially finished food materials that are diseased, more or less decomposed, or otherwise undesirable for similar reasons.

Undoubtedly the most important development in the food control work of many of the states of the Union in recent years has been the extension of the Service for the purpose of securing the public from the results of the use of unsanitary materials and from the preparation and handling of foods under unsanitary conditions.

It is true that paragraph six of section three of the General Food Law was designed to secure the public against unsanitary conditions in food manufacture and handling.

It might therefore appear to the casual reader of the General Food Law that its provisions are adequate to secure for the citizens of Pennsylvania the same measure of benefits that the sanitary food laws and regulations of other states, such as, for example, Indiana, Louisiana and North Dakota, are affording the citizens of those commonwealths. A careful investigation of the General Food Law in these respects must, however, very promptly lead to a different conclusion. As a matter of fact, under the Pennsylvania Food Act of 1909, the history of the raw materials and the conditions of preparation and handling must be determined solely by the examination of the finished article after its sale to the consumer or to the Bureau's agent representing the consumer. The discovery of the facts that should be known is necessarily very incomplete where the means of discovery are so limited, and this phase of the food service in Pennsylvania is, therefore, much more inadequate than that which is given by many states to their citizens through their food control agencies. The man who is careless in making the foods that others are to eat, inclines to sneer at a declaration of need for cleanliness in this connection. He says that what people don't know won't hurt them; that the offense is rarely against the health in any considerable measure; that mere sentiments alone are concerned and that it would be a pity to disturb ignorance so blissful to the ultimate consumer. But civilized beings are not satisfied with the rude kitchen and table manners of the savage. The civilized man's eating is not merely a mode of getting bodily nutriment, let us say. In the well-conducted home, the table is the center of good cheer and no food will be welcomed to the menu as to whose sanitary quality and history there is even remote suspicion. Where food is domestically produced and prepared, the cleanliness and soundness of the food and of the utensils used in its preparation are matters of prime importance in every well-conducted household. The people have a right to expect and to make sure that when their food supplies are produced and more or less fully prepared in centralized factories, the conditions of soundness and cleanliness shall be maintained just as much as they would be under the eye of the skillful housewife. Undoubtedly, reasonable legislation designed to secure these conditions is regarded as desirable by the average consumer.

It is not here meant to imply that the general conditions of food production and handling are gravely unsanitary or that exceedingly undesirable food materials are used in preparing the staple products. There are, however, many individual cases where the buildings in which foods are manufactured are gravely unsanitary, where the care of the persons of the employes is not what it should be, where water supplies are unfit, where there is undesirable contact of the persons of the employes with the food materials, where the foods in course of preparation are not adequately protected from dust, flies, and other contaminating agencies; and the existence of shops handling food wares in ways undesirable from the sanitary standpoint, is a matter of everyday knowledge. The far-sighted, enterprising food producers and food vendors realize that the existence of such establishments has a disproportionately large effect upon public confidence in all foods that are not homemade, and that the result is a considerable reduction in the volume of the trade which they would otherwise secure. While they very naturally object to laws and general statements which may reflect upon the conduct of their own establishments, many are desirous of having offenses existing in less carefully conducted factories and shops, reduced. As specific instances of this attitude upon the part of progressive food producers may be cited the resolution adopted by the Pennsylvania Association of Ice Cream Manufacturers in favor of the enactment of such sanitary measures as shall correct the abuses in certain small ice cream factories in densely populated parts of our cities; also the report of the Committee on Sanitation of the National Canners' Association, which urges sanitary legislation much more drastic and rigid than any Food Commissioner in America has ventured to propose.

What is needed is additional power on the part of the Dairy and Food Commissioner to supervise the conditions of production, manufacture, sale and delivery, and, so far as it may be necessary, to safeguard the soundness of materials and the sanitariness of surroundings essential to the production and delivery of clean, sound foods. Surely the policy of adopting modern methods for the prevention of undesirable conditions is more rational than the condemnation of products after their appearance upon the markets, for the former method conserve the food supply, the latter tends to waste it.

In this connection, I welcome the opportunity to call attention to the progress made in some of our sister commonwealths in the elimination of unsanitary conditions in food manufacture and sale, and to note that these improvements have been secured without recourse to more drastic procedure of the courts. The food agents in these states visit not to punish, but to help. The introduction of methods of scoring factories, warehouses and shops as to sanitary conditions and the publication of scores, have developed a wholesome competition between food factories and food shops without the need for recourse, except in very rare cases, to legal proceedings as a means for obtaining obedience to the law and the marked improvement in sanitary conditions. There is no good reason for believing that the same policy would not be likewise productive of desirable results in Pennsylvania. Under this policy, the Food Commissioner, cooperating with the food producing and selling interests, does little more than promote the organization of these interests for their self-improvement.

It is true that such a policy would be an innovation in connection with food control work in Pennsylvania. Constructive work on the part of the Dairy and Food Bureau has in the past been practically impossible because there has been no legal authorization of such action and no financial provision for its maintenance. There is much ground for a complaint of injustice on the part of food producers and sellers, when statutory offenses are created by laws of very general scope, without some balancing provisions for assistance to the producing interests in solving the new problems raised by the new requirements. An attitude of reasonable consideration and helpfulness on the part of the State toward those whose business is subjected to those requirements should, it seems to me, appeal to every sensible citizen.

It may be objected that the suggested legislation would entail large additional expense. But experience elsewhere has shown that most of this work can be performed without any increase, or at least any large increase, in the number of agents required for such service as is already performed in Pennsylvania by the Food Bureau. All that is necessary is, in some cases, a little additional expert service and the careful instruction and organization of the working force for their added labors. The result elsewhere has been a marked gain to the public with very little additional cost and, where the policy has been constructive, with no serious demoralization of the producing and selling interests. Quite the contrary, the attitude of these interests has been one of welcome for the construction policy, which has won a more hearty cooperation for all the work of the food law executive.

There is another department of the food service, using the word "food" in its broader sense, which is at present lacking the necessary authorization for satisfactory control, namely, that comprising the production and sale of alcoholic liquors. It was undoubtedly the intention of the framers of the original General Food Law of 1895 that that law should act in the case of liquors as well as of foods, to guard against adulteration and misbranding, but a flaw in the title of the act gave ground for a decision by the Supreme Court, a few years later, that arrested all action by the Bureau to prevent the adulteration and misbranding of these commodities. There is certainly no sound reason why abuses of this character in the case of liquors should be any less condemned and less guarded against than in the case of foods, for both are articles of human consumption. The status of the production and sale of alcoholic drinks is now a matter of worldwide discussion. Whatever the public decision may be upon questions of local option and prohibition, it is clear that the fact of the present agitation upon these matters of public policy, should not be made the ground for the non-protection of the public against adulteration and fraud in case of alcoholic drinks so long as their use continues. I would respectfully urge that proper steps be taken to reenact the legislation necessary to prevent adulteration and fraud in the liquor trade.

EXECUTIVE ORGANIZATION

The history of American police laws has shown the existence of a marked tendency to subdivide between numerous isolated offices the responsibility for the enforcement of laws dealing with the same subject matter. This tendency has various reasons for its existence. But the adoption of this kind of provision for dealing with subject matter of a single broad class necessarily results in much duplication of labor, overlapping of responsibility, executive confusion and jealousies, and a lack of proportion in the treatment of such matters as a whole. The same reasons which have operated to produce this condition of affairs in other commonwealths, exist also in Pennsylvania. It is earnestly urged that the opposite policy has proved in general more efficient and economical and far less vexatious to the interests under control than is the case where representatives from separate branches of the State service visit and demand attention, one after another, from the same factory manager or store keeper.

FEDERAL RELATIONS

When the passage by Congress of a National Food and Drugs Act was under discussion, the first argument in favor of such enactment was that it would assist in unifying and harmonizing the bodies of food control law and regulations in the several commonwealths. In fact, the Food and Drugs Act of 1906 has been copied literally in many of the states and much of the confusion existing prior to that date has disappeared. Absolute uniformity in the laws of the several commonwealths upon any subject is, however, rarely, if ever, attained. Many are of the opinion that absolute uniformity would stand in the way of progress and improvement. On the other hand, there can be no sound objection to the cultivation of such cooperation between the National and State agencies that shall reduce confusion, strengthen advantageous policies and give to all the benefit of the knowledge and experience gained by each. I desire to express at this point my appreciation of the service which the United States Department of Agriculture is performing for the food control officers of the several states through its newly established office of State Relations, which is serving as a clearing house of information useful to food law officers.

LEGAL OPINIONS

The discussion of this part of my report would be incomplete without reference to matters of general interest which have been made the subject of opinions by Deputy Attorney General William M. Hargest, in reply to questions addressed to the Attorney General from this office. The first of these opinions relates to the question, "whether a merchant holding a license to sell oleomargarine at retail can take orders for this product in cities and towns other than the one designated in the license. and fill such orders by delivering the product by vehicle or otherwise," a question of grave importance under the Pennsylvania Oleomargarine Law. The second opinion is in relation to a question of the limits of application of the Pennsylvania State Food Law where the commodity is also subject to the provisions of the National Food and Drugs Act. Several years ago in the case known as McDermott vs. Wisconsin, the United States Supreme Court handed down a decision determining this matter in relation to a particular case, and in so doing expressed certain principles that should govern the interpretation of this opinion as applied to other cases. This decision has lead to considerable difference in the judgments of various legal authorities, and for the guidance of the Dairy and Food Bureau the question was referred to the Attorney General's Office for an opinion, which was prepared by Deputy Attorney General William M. Hargest. These two opinions are presented in full as papers Nos. I and II of the appendix to this report. The matter of the latter opinion is so important in its relation to the general question of the police powers of the State, that it should interest every citizen.

SUMMARY OF THE BUREAU'S ACTIVITIES DURING 1915

The organization of the Bureau has been little changed during the past year, and the methods of operation found successful in the early years of the service, have been continued with little modification.

In the immediately following paragraphs is presented a summary of the Bureau's operations during 1915. Such matters of detail as require mention will be reserved for a later section of this report.

During 1915, the chemists of the Department analyzed 8,939 samples of various food stuffs and there were 1,165 prosecutions terminated for violations of the food laws. The several classes of materials on account of whose adulteration or misbranding these prosecutions were instituted are as follows: Milk, 625; Coffee and Chicory, 2; Cold Storage foods, 76; Eggs, 17; Food, 176; Ice Cream, 41; Lard, 8; Non-Alcoholic Drinks, 76; Oleomargarine, 16; Renovated Butter, 2; Sausage, 25; Vinegar, 101.

There was a large increase in the number of oleomargarine licenses during the year, due to the vigilance of the field agents in prosecuting dealers selling without license.

The receipts* of the Dairy and Food Bureau for the past year were $279,055.40, as against $225,910.78 in 1914. This money has been deposited with the State Treasurer for the use of the Commonwealth and is shown to be $193,154.04 in excess of the expenditures, which are provided for by special appropriation.

In the following table the numbers of samples analyzed and of cases terminated, and the receipts and expenditures during the period beginning with 1907 and ending 1915 are stated:

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*For a classified statement of receipts and expenditures, see Appendix V.

Year	Samples analyzed	Cases terminated	Receipts	Expenditures
1907,	7,400	664	$55,732 63	$78,455 88
1908,	8,300	300	54,580 62	69,968 20
1909,	6,200	797	86,594 15	83,700 00
1910,	5,594	667	110,802 95	79,661 65
1911,	8,200	1,029	120,993 48	83,083 15
1912,	7,204	1,049	136,125 49	81,858 55
1913,	6,846	1,025	173,789 76	75,587 12
1914,	4,827	1,010	225,910 78	73,271 41
1915,	8,939	1,165	279,055 40	85,901 36
	63,510	7,706	$1,243,585 26	$711,487 32

It will be seen from these figures that 1915 has been a record year with respect to each of the items included in this table. It would be an error to judge that food adulteration and misbranding are increasing because the number of cases terminated has been greater in 1915 than in any preceding year. The condition of the food market shows exactly the opposite to be the fact. The increasing number of cases is the result, in part, of the increased number of examinations; in part, of improved methods of examination whereby defects that previously eluded proof, can now be established with certainty; in part, to the increased experience of the agency force; and, in part to additional legislation that has defined some of the offenses more specifically.

While the major portion of the time of the Bureau's experts has, as in the past, been devoted to the current examination of miscellaneous food samples, as they have been received, it has been found possible to provide for two investigations of a more general character. The first of these was undertaken for the purpose of better enforcement of the Milk Law and was assigned to Professor C. B. Cochran, of this Bureau. This investigation related particularly to the comparative composition of the milks from different breeds of cows, with an additional study of the composition of butter, particularly in relation to its water content. The results of these investigations appear in Bulletin No. 268, of this Department, written by Professor Cochran, who has brought together in it not only the results of his own work, but the work of other American milk investigators relating to the same subject. This bulletin will be of value to every food analyst and should be of interest to all milk producers and vendors.

The second investigation deals with tomato ketchup and was made under the direction of Dr. C. H. LaWall, of this Bureau. Its purpose was to make a general survey of the condition of the tomato ketchup on sale in the State with respect to the use of preservatives, saccharin, and artificial colors, the concentration of the ketchup, its acidity and the presence of moulds and bacteria. The results of this survey are printed in Bulletin No. 272. The condition of this very generally used table sauce was found to be gratifyingly excellent.

MATTERS OF SPECIAL COMMENT AS TO ADULTERATION IN PARTICULAR CLASSES OF FOODS

In the foregoing summary it was stated that 8,939 samples of various foods were analyzed or otherwise examined. The numbers of samples of the several classes of foods are grouped in accordance with the laws under which they were examined, and are as follows:

Butter,	263
Cheese,	5
Cream,	1,025
Milk,	5,193
Cold Storage Products,	108
Eggs,	168
Fruit Syrups,	7
Ice Creams,	325
Lard,	10
Non-Alcoholic Drinks,	354
Oleomargarine,	65
Renovated Butter,	2
Sausage,	62
Vinegar,	371
Food,	900
Miscellaneous,	81
	8,939

A detailed summary of the subordinate kinds of foods examined, is presented in paper No. III of the Appendix. In paper No. IV of the Appendix is presented a classified list of the cases terminated, including a statement of the kinds of foods which were adulterated and misbranded and the general nature of the offense. It should be recalled that this list of cases terminated does not correspond precisely with the respective groups of foods collected for examination and examined during 1915. As stated repeatedly in previous reports, publication of legal proceedings under the food acts is deferred until the courts have pronounced judgment upon the cases presented for their decision. It follows necessarily that, owing to the time required for the legal proceedings, a case terminated in one year may have been instituted as the result of examinations made the year preceding. For the purpose, however, of a general survey of conditions, this lack of correspondence between samples examined and cases terminated within a given period, may be overlooked.

OLEOMARGARINE

The goods effects noted in my report of 1914, resulting from the amendment of 1911 of the Oleomargarine Act so as more specifically to fix the color limit for oleos, has continued also during 1915. My judgment that oleomargarine sold under conditions such as to prevent its confusion with butter and such, also, as to permit the development of its best flavors without impairment by cottonseed oil and like high flavored ingredients, would find it an increasing market, has been amply confirmed. At the same time, butter has found a market on its own merits and free from the disadvantages that existed so long as the buying public could not tell clearly at the time of purchase which of these two products it was securing. During the year, about sixty-five samples were examined and sixteen cases terminated for violation of the law. Of these sixteen cases, but four were instituted because of coloration of this product contrary to law. The remaining twelve cases were due to sales without proper license.

The market for renovated butter continues to be very small. The number of samples found on sale are very low; but two samples of this material were examined during the past year and two cases terminated because this product was sold without the required license.

VINEGAR

Few food products have been subject to so many phases of adulteration and misbranding as cider vinegar. The preservation of a market for cider vinegar upon its own merits is of prime importance to the orchardist. While there are a number of wholesome vinegars produced from other materials, cider vinegar continues to have the chief demand in Pennsylvania. It is no secret to vinegar producers that the skill used in imitating cider vinegar is unsurpassed in other lines of food production and renders very difficult the task of the food experts working for the protection of the public. The Bureau has maintained its full measure of activity to discover and prevent frauds of this character. During 1915 three hundred and seventy-one vinegars were examined and one hundred and one cases terminated for violation of the Vinegar Law. Twenty of these cases were terminated because the vinegars were found to contain added water. In two or three instances the product was so low in acetic acid as not to be entitled to the name "vinegar." Nearly all the other cases were brought because the products were found to be either entirely made up of substitute materials or to consist of mixtures with cider vinegar.

MILK

Fifty-one hundred and ninety-three samples of milk were analyzed and nearly five hundred cases were terminated because of adulterations of this product or because it contained less than the standard amount of butter-fat or solids. In one case only was added preservative (formaldehyde) found. In over two hundred and thirty cases, the evidence and tests showed adulteration of the original composition of milk by watering or skimming, or both. In the remainder of the cases, the examination indicated no more than that the milks were sub-standard in composition.

CREAM

Ten hundred and twenty-five samples were examined and one hundred and thirty-one cases terminated because the creams were of less richness than the law required for sale under that name.

BUTTER

Two hundred and sixty-three samples of butter and five samples of cheese were analyzed. These examinations resulted, however, in the termination of no cases.

ICE CREAM

Ice creams to the number of three hundred and twenty-five were subjected to analysis, and forty-one cases terminated for adulteration, all of them because the ice creams in question contained less than the required amount of butter-fat.

MEAT

Meat products other than cold storage foods included one hundred and seventeen samples of fish and oyster products and forty-seven samples of canned and fresh meats. But ten cases were terminated for adulteration of these products, most of them because the meats were so far decomposed to be unfit for food purposes, and several because goat meat was sold under the name of "lamb," and because baby veal was being offered for sale, in one case, because the material, hamburg steak, was adulterated with sulphur dioxide.

SAUSAGE

Sixty-two samples were analyzed and twenty-five cases terminated. Out of these cases, three were brought because the sausage had become unfit for food; three because sulphur dioxide had been added; eight because cereals or vegetable flour had been used as an ingredient contrary to law; sixteen because an excess of water was found in the sausage; and in one case, beef sausage was sold as and for pork sausage.

LARD

But ten samples of lard were analyzed during the year and eight cases terminated for adulteration or misbranding. In three of these cases, defective labeling was charged; in five, the addition of cottonseed oil and beef stearin as substitutes in part for lard fat proper.

SAMPLES EXAMINED UNDER THE GENERAL FOOD LAW

The examination of the food supplies coming particularly under the General Food Act included the analysis of over nine hundred samples. One hundred and seventy-six cases were terminated for offenses under this act. Of these cases, sixty-nine, or over one-third, were instituted because of the use of sulphur dioxide, without declaration, usually in dried fruits where the law specifically permits the use of this preservative and bleaching agent, but requires that its presence be declared. This large proportion of cases of this character indicates the need for much larger exercise of care on the part of food dealers to observe the requirements of the general law. The use of benzoate of soda in excessive amounts—that is, in amounts beyond the limits fixed by law, or in materials in which it has not commonly been used, is very much more limited than it was a few years ago. Sixteen cases, or about one-eleventh of the entire number terminated, were instituted because of the illegal use of this preservative. There were three cases, also, in which imported peas were found to have been colored green by the use of compounds of copper. Of the same general class of cases, may be mentioned three of flour bleached by the use of nitrites.

Decomposition and contamination were, despite the difficulties of their detection, the bases of condemnation in thirty-six out of the one hundred and seventy-six cases terminated.

In this connection may be mentioned the special investigation made during the summer of 1915 to determine the condition of the breakfast foods in stock at the close of the summer season. The Bureau has, as a policy growing out of the condition found in a general examination made some years ago, sent each summer to every grocer a warning as to the care of breakfast food stocks. The examination of 1915 was made by Dr. William Frear of State College, Pennsylvania, who had conducted the original examination for this Bureau. The samples taken for the present examination represented very broadly the stocks of the various brands of breakfast foods found in stores in all parts of the State. The scope of the examination was limited almost exclusively to the condition of the food in respect to insect attack, and was not of such extent as to furnish material appropriate for bulletin publication. The results of this examination were most gratifying. The stocks were found in almost every instance to be in fresh cartons, clean and free from weevil attack. Pronounced contamination of this character was found in but a single sample of goods much shelf-worn. The grocers of the State are to be highly complimented for their improved care of their stocks of this class, and the public to be congratulated likewise because of the advantages this improvement affords to every consumer of breakfast food.

The general freedom of staple groceries, including canned goods, and spice supplies in particular from serious adulteration and misbranding, continues to merit specific mention. It would be a grave error for food officers to claim the exclusive merit for the vast improvement in these food supplies. Certainly no less credit is due to the public-spirited efforts of the Wholesale Grocers' Association and of such progressive organizations of food producers as the National Canners' Association. The general support which such organizations have given to the relief of the public from the evils out of which grew our body of food laws, deserves high praise.

CANDIES

Of sixty-seven samples of candy, chiefly of the cheaper "penny" varieties, only four cases were terminated. All of these cases related to so-called "licorice" products from which licorice was either entirely or almost entirely absent and imitation colors and flavors replaced it.

The appearance of glucose as an adulterant has almost disappeared. Among the cases terminated there was but one, that of honey, in which adulteration of this substitute material was found.

COFFEE

Forty-two samples of coffee were examined and nine cases were terminated under the General Food Act for adulteration with chicory or with chicory and cereals, and two cases under the Chicory and Coffee Act of 1915 because, in one case, of the presence of cereals, and in the other case because of misbranding.

NON-ALCOHOLIC DRINKS

Three hundred and fifty-four samples of these drinks were examined and seventy-six cases terminated. Of these, two cases were brought because the preparations were intoxicating liquors sold under the names of non-alcoholic drinks; twenty-six because of the use of saccharin; twenty-four because of the presence of undeclared artificial colors and flavors; and twenty-seven because of misbranding.

COLD STORAGE ACT

There remains for consideration the enforcement of the Cold Storage Act. Some idea of the volume of the cold storage business during the year covered by this report may be gained from the sub-joined table. This table states the amounts of cold storage food, by classes, found in storage on March 31st, June 30th, September 30th and December 31st, 1915. These data are compiled from the quarterly reports required by law from the various cold storage warehousemen.

QUANTITIES OF FOODS IN PENNSYLVANIA COLD STORAGE WAREHOUSES

Foods.	Units of quantity.	1915, March 31.	1915, June 30.	1915, Sept. 30.	1915, Dec. 31.
Meats:					
Whole carcasses:					
Beef,	Lbs.	883,623	31,300	164,957	588,685
Veal,	Lbs.	14,856	15,014	31,824	16,821
Lamb and mutton,	Lbs.	256,843	85,926	70,881	241,002
Hogs,	Lbs.	539,362	277,462	60,606	369,421
Parts of carcasses, classified:					
Beef,	Lbs.	1,520,549	1,151,422	958,536	787,966
Veal,	Lbs.	6,429	25,563	36,159	47,796
Lamb and mutton,	Lbs.	87,623	33,468	23,242	67,435
Hogs,	Lbs.	1,255,695	1,102,643	592,311	823,817
Game,	Lbs.	7,422	6,978	7,016	8,738
Fish,	Lbs.	405,912	1,800,188	4,190,388	4,172,492
Domestic poultry,	Lbs.	3,438,743	2,361,479	1,039,576	2,305,311
Eggs:					
In shell,	Doz.	1,677,763	18,800,169	15,903,851	2,613,541
Broken,	Lbs.	322,109	362,878	452,619	338,225
Butter,	Lbs.	906,040	4,964,877	9,744,913	3,452,796

The use of cold storage facilities for the storage of foods for periods of less than three months is very large. For this reason, the above given quarterly statements fail to afford a proper notion of the entire volume of foods held by cold storage warehouses in this State. The attitude of the cold storage warehousemen toward the enforcement of the act has been willing, in spite of the vexations due to certain terms of the law. The complaint continues that the Pennsylvania law deprives the Pennsylvania warehouses of some business which would normally be theirs, and that the reason for this deprivation is the fact that neighboring states have no like laws. On the other hand, it is clear that if one state waits until all the states have acted or are ready to act in concert, protective legislation necessary for the public good must be indefinitely postponed. The present Cold Storage Law is criticised because of the specific time limits it imposes on the storage of different classes of foods. It is possible that amendments of these limits might be advantageous and also that some clearer and more practical definition of the cold storage warehouse and the cold storage process could be devised. On the other hand, none of the substitutes which have been brought to consideration of this office provides so adequately for the protection of the people against the sale of cold storage foods as fresh, nor so well provides for the tracing of cold storage foods from the warehouse to the consumer. The advantages of the present law in these two particulars are certainly very marked.

The inspection of warehouses as to their equipment and sanitary condition continues to reveal a very satisfactory state of affairs. The warehousemen show entire willingness to meet promptly any reasonable suggestion in respect to sanitary conditions. The examinations of cold stored foods have been very numerous, and the examinations of such foods by chemical experts were one hundred and eight. Seventy-six cases were terminated for violation of the Cold Storage Act of 1915; three because the foods were stored beyond the legal limit; sixty-seven because the stamping requirements were not observed; and five because cold storage eggs were sold as and for fresh eggs. The difficulties of detection of cold stored eggs imported from other states as fresh eggs have been, in part at least, removed as the result of the investigations made by experts of this Department.

One hundred and sixty-eight examinations of market eggs were made, of which one hundred and twenty-three represented fresh eggs in shell, and the remainder either frozen, canned or opened stock The experts of the Bureau have given special attention to the means of distinguishing between fresh eggs, held eggs, and cold storage eggs. Especial recognition should be given to the work of Dr. F. T. Aschman and Professor Charles H. LaWall in this relation. Seventeen cases were terminated: fourteen of which were because of the sale of eggs unfit for food purposes and three because of the having in possession of rotten eggs not properly denatured. The conditions of the egg supply in the markets and bakeries of our larger cities continue to exhibit very marked improvement as the result of the enforcement of the egg laws.

From what has been stated above, it is very manifest that most of the offenses charged under the Act of 1913 have been due to neglect of the stamping requirements. There was found in the cold storage warehouses a very much smaller amount of foods unfit for human consumption, than was present at the time the law went into force. The cold storage warehousemen cannot properly be held in equity as wholly responsible for the overstorage of foods. This is clear when it is recalled that the function of the warehouseman is simply to rent clean, cool space. The overstorage of foods is chiefly the fault of the renter. The fault is exclusively that of the warehouseman only in those cases of which he is the owner of the food stuffs stored.

ACKNOWLEDGEMENTS.

I desire again to express, in this connection, my appreciation of the hearty support rendered to me by my office force, food agents, counsel and food experts, without whose intelligent, active and loyal assistance, the work of my Bureau could not have been successfully conducted. I am under obligation also to the Attorney General's Office, more especially to Deputy Attorney General William M. Hargest, to whose care the legal phases of the work of this Bureau have been specifically assigned, for cordial co-operation.

My acknowledgments are due also to Governor Brumbaugh, former Secretary Critchfield and yourself for the warm encouragement and support I have received from my superior officers in the conduct of this work; and finally I may not, in fairness, omit to mention as important elements in the success of the work of this Bureau, the interest of the several courts of the State and of the public press.

Very respectfully,

JAMES FOUST,

Dairy and Food Commissioner.

APPENDIX

SUMMARY

The following gives a list of articles analyzed by Chemists of this Bureau during the year 1915.

Article	Number Analyzed
COLD STORAGE PRODUCTS:	
Beef,	1
Beef livers,	1
Beef and sheep livers and kidneys,	1
Butter,	1
Eggs,	79
Fish,	9
Fish, Blue Pike,	1
Fish, Butter,	1
Fish, Sea Trout,	1
Fish, Smelts,	10
Fish, Whiting,	1
Pork loins,	1
Turkey,	1
	108
DAIRY PRODUCTS:	
Butter,	263
Cheese,	5
Cream,	1,025
Milk, butter,	8
Milk, condensed,	5
Milk, evaporated,	4
Milk, skimmed,	26
Milk,	5,150
	6,486
EGGS:	
Fresh, in shell,	133
Frozen,	13
Frozen, canned,	10
Opened,	10
	168
FOOD PRODUCTS:	
Bread, Cakes and Puddings:	
Bread,	4
Cake, Chocolate,	3
Cake, Chocolate Iced,	2
Cake, Currant,	2
Cake, Famous,	1
Cake, Golden,	1
Cake, Golden Rod,	1
Cake, Goodie,	1
Cake, Italian,	1
Cake, Jelly Roll,	6
Cake, Layer,	2
Cake, Marble,	2
Cake (no name given),	4
Cake, Orange,	1
Cake, Sponge,	15
Cake, Tasty,	1
Cookies, chocolate covered,	1
Cornstarch,	2
Gelatin,	1
Gelatin, granulated,	1
Go-Zo (Orange flavor),	1
Jello (Cherry flavor),	1
Jello (Lemon flavor),	1
Jello (Orange flavor),	1
Jello (Peach flavor),	1
Jello (Raspberry flavor),	1
Jello (Strawberry flavor),	2
Puddine (Lemon flavor),	1
Puddine (Orange flavor),	2
Pudding, chocolate,	1
Pudding, creamed,	1
Tapioca,	3

SUMMARY—Continued.

Article	Number Analyzed
FOOD PRODUCTS—Continued.	
Breakfast Foods:	
Aluminum Brand Crushed Oats,	1
Biltmore Wheat Hearts,	1
Banner Rolled Oats,	1
Brown's Triangle Breakfast Food,	1
Corn Flakes,	1
Corn-O-Plenty,	1
Cream Oatmeal,	1
Cream of Wheat,	1
Dilworth's Rolled Oats,	1
E-C-Corn Flakes, Toasted,	1
Edward's Brand Rolled Oats,	1
Elite Brand,	1
Farina,	2
Force,	1
G-O-Rolled Oats,	1
Grape Nuts,	1
H-O-Force Toasted Wheat Flakes,	1
Holland Rusks,	1
Honey Crisps Toasted Corn Flakes,	1
Jersey Corn Flakes,	1
Jersey Wheat Flakes,	1
Kellogg's Toasted Corn Flakes,	1
Mother's Crushed Oats,	2
Mother's Wheat Hearts,	1
Monarch Rolled Oats,	1
Malt Breakfast Food,	1
Maple Flakes,	1
Maple Flakes, Whole Wheat, Toasted,	1
Medal Brand Corn Flakes,	1
National Oats,	1
National Rolled Oats,	1
Onward Brand Rolled Oats,	1
Oat Meal,	1
Oriental Rolled Oats,	1
Old Fashioned Scotch Brand Oatmeal,	1
Parched Farinose,	1
Pearled Barley,	1
Pettyjohn's Breakfast Food,	1
Post Toasties,	2
Post Tavern Special,	1
Premium Hominy,	1
Premier Oat Flakes,	1
Princess Royal Rolled Oats,	1
Puffed Rice,	1
Purity Brand Rolled Oats,	1
Quaker Corn Flakes,	1
Quaker Corn Puffs,	1
Quaker Puffed Wheat,	1
Rainbow Oats,	1
Ralston Wheat Food,	1
Rolled Oats,	4
Satisfaction Oat Flakes,	1
Saxon Rolled Oats,	1
Saxon Wheat Food,	1
Servus,	1
Servus Corn Flakes,	1
Shredded Whole Wheat,	1
Silver Flake Brand Corn,	1
Sunbeam Crushed Oats,	1
Toasted Corn Flakes,	1
Toasted Rice Flakes,	1
Trix Breakfast Food,	1
Un-gro-Co. Rolled Oats,	1
Uncle Sam's Health Food,	1
Victor Toy Oats,	1
Washington Crisps, Corn,	1
Weidman's Pressed Oats,	1
Wheatena,	1
Wheatlets,	1
Canned Fruits and Vegetables:	
Beans,	1
Cherries,	5
Cherries, Cocktail,	1
Cherries, Maraschino,	23
Corn,	1
Mincemeat,	3
Mushrooms,	2
Peas,	6

SUMMARY—Continued.

Article	Number Analyzed
FOOD PRODUCTS—Continued.	
Canned Fruits and Vegetables—Continued.	
Peas, Spanish,	1
Pineapple,	1
Rhubarb,	1
Sauer Kraut,	1
Dried Fruits:	
Apricots,	8
Figs,	12
Peaches,	46
Pears,	1
Raisins,	5
Catsup, Oil, Pickles, Sauces, etc.:	
Catsup (no name given),	29
Catsup, Tobasco,	2
Catsup, Tomato,	104
Chow Chow,	1
Club Chutney,	1
Gherkins, Sweet,	9
Horseradish,	2
India Relish,	1
Oil, Cottonseed,	5
Oil, Olive,	14
Pickles, Dill,	2
Pickles, Sweet,	17
Pickles, Sweet Crooks,	1
Pickles, Sweet, Mixed,	16
Pickles, Sweet, Spiced,	2
Sauce, Chili,	1
Sauce, The Chef,	1
Sauce, Tomato,	1
Sauce, Worcestershire,	3
Salad Dressing,	2
Salad, Onion,	1
Salad, Tomatoette,	1
Coffee:	
Coffee, cups of,	15
Coffee, compound,	4
Coffee, ground,	10
Coffee, pulverized,	1
Eight O'Clock Breakfast Mixture,	1
Rhenus,	1
Confectionery:	
Bonbons, mixed,	1
Candied Figs,	1
Candy,	
Candy, Brown,	1
Candy, Canes,	1
Candy, Girard Squares,	3
Candy, Green Ribbon,	1
Candy, Gum Drops,	1
Candy, Jelly Eggs,	1
Candy, mixed,	4
Candy, Pink Ribbon,	1
Candy, Raspberry Flavor,	1
Candy, Red Ribbon,	1
Candy, Suckers,	1
Chocolate Almond Bars,	1
Chocolate Candy,	2
Chocolate Creams,	1
Chocolates, mixed,	2
Chocolate and Vanilla Candy Chickens,	1
Cocoanut Bonbons,	1
Cocoanut Caramels,	1
Cocoanut Squares,	1
Daffy Dill Candy,	1
Fudge, assorted,	1
Fudge, Cherry,	1
Fudge, Cherry and Raisin,	1
Fudge, Chocolate,	1
Fudge, Chocolate and Cocoa,	1

SUMMARY—Continued.

Article	Number Analyzed
FOOD PRODUCTS—Continued.	
Confectionery—Continued.	
Fudge, Cocoanut,	1
Jolly Cops Candy,	1
Licorice Candy,	1
Lolly Pops Candy,	4
Marshmallows,	5
Marshmallows, chocolate,	1
Marshmallows, strawberry,	1
Marshmallows, whip,	2
Montague Mello,	1
Prize Bag Candy,	1
Snow Flakes,	1
Walnut Candy Squares,	1
Fish, Canned, Dried and Fresh:	
Breakfast Roe,	1
Codfish,	44
Codfish, dried,	3
Codfish, flaked,	1
Codfish, salt,	2
Codfish, shredded,	9
Fish cakes,	1
Fish, canned,	1
Fish, flaked,	2
Fish, fresh,	4
Fish, threaded,	1
Fish, Tuna,	4
Halibut,	1
Herring,	1
Oysters (fresh),	7
Salmon, canned,	8
Sardines,	20
Shrimps,	2
Shrimps, cooked,	3
Smelts,	1
Trout, Sea,	1
Flavoring Extracts:	
Lemon,	3
Orange,	2
Vanilla,	2
Flour:	
Flour, Buckwheat,	3
Cornmeal,	1
Flour, Graham,	1
Ka-Ko (prepared cake flour),	1
"Kaketop" (prepared cake flour),	1
Flour, rice,	1
Flour, soup,	1
Flour, wheat,	5
Fruit Butters, Jams, Jellies and Preserves:	
Butter, Peanut,	3
Jam, Blackberry,	1
Jam, Fruit,	2
Jam, Peach,	1
Jelly, Apple,	2
Jelly, Blackberry-Apple,	1
Jelly, Crabapple,	1
Jelly, Currant,	2
Jelly, Fruit (no flavor given),	1
Jelly, Grape,	1
Jelly, Grape-Apple,	1
Jelly, Raspberry,	1
Jelly, Strawberry,	1
Jelly, Strawberry-Apple,	1
Jelly, Wine,	1
Preserves, Peach-Apple,	1
Preserves, Raspberry,	1
Preserves, Strawberry,	2
Preserves, Strawberry Apple,	1

SUMMARY—Continued

Article	Number Analyzed
FOOD PRODUCTS—Continued.	
Honey and Syrups:	
Honey,	4
Syrup, crystal white,	1
Syrup, maple,	7
Syrup, table,	3
Meats: Canned and Fresh:	
Beef Butts,	1
Beef, Corned, canned,	1
Beef Loaf,	1
Beef, sliced,	2
Beef, sliced, smoked,	1
Beef Steak and Onions, canned,	1
Chicken,	2
Goat,	2
Hamburg Steak, canned,	1
Hamburg Steak, fresh,	6
Hog's Head,	1
Lamb, shoulder of,	1
Meat, canned,	1
Meat, Capicola,	1
Meat, cooked,	1
Meat, Crab,	1
Meat, potted (no brand given),	4
Mutton, leg of,	1
Pork,	1
Pork and Beans, canned,	1
Pork, shoulder of,	7
Pork, spare ribs, fresh,	2
Pudding and scrapple,	2
Turkey,	3
Veal,	2
Soups:	
Soup, Chicken,	1
Soup, Knorr,	1
Soup, Tomato,	1
Spices, etc.:	
Pepper, Black, ground,	2
Pepper, Cayenne,	1
Mace, Bombay,	1
Mace, ground,	1
Mustard, prepared,	1
	900
FRUIT SYRUPS:	
Orange,	1
Pineapple,	1
Raspberry,	4
Vanilla,	1
	7
ICE CREAMS:	
Bisque,	2
Caramel,	1
Cherry,	8
Chocolate,	10
Ice Cream (no flavor given),	11
Lemon,	1
Maple,	3
Maple-Walnut,	1
Maraschino,	1
Peach,	3
Pineapple,	2
Strawberry,	37
Vanilla,	235
	325

SUMMARY—Continued

Article	Number Analyzed
LARD,	10
NON-ALCOHOLIC DRINKS:	
Birch Beer,	[illegible]
Cherry Bounce,	1
Cherry Cheer,	1
Cider, Apple,	2
Cider, Orange,	1
Cider, Sweet,	2
"Cream of Hops,"	2
Ginger Ale,	4
Grape Juice,	1
"Hebe,"	1
"Hop Tonic,"	1
Lemon Sour,	2
"Near Beer"	1
Orangeade,	9
Orange Julep,	1
Phosphate, Cherry,	1
Pop, Lemon,	2
Pop, Orange,	2
Pop, Strawberry,	8
Root Beer,	9
Sarsaparilla,	7
Soda, Cherry,	7
Soda, Cream,	4
Soda, Lemon,	96
Soda (no flavor given),	5
Soda, Orange,	9
Soda, Pear,	1
Soda, Pineapple,	26
Soda, Raspberry,	30
Soda, Strawberry,	103
Soda, Vanilla,	2
"Sparkade,"	1
"Top Notch Grape,"	1
"White Ribbon Temperance Beverage,"	2
	354
OLEOMARGARINE,	65
RENOVATED BUTTER,	2
SAUSAGE:	
Sausage,	2
Sausage, Bologna,	6
Sausage, Fresh Pork,	37
Sausage, Frankfurters,	4
Sausage, Meat,	2
Sausage, Pork,	5
Sausage, Pork and Beef,	2
Sausage, Vienna,	2
Sausage, Wiener,	2
	62
VINEGAR:	
Vinegar, Amber,	1
Vinegar, Apple,	6
Vinegar, Cider,	283
Vinegar, Distilled,	17
Vinegar, Fermented Syrup,,	10
Vinegar, Fermented Syrup, distilled,	1
Vinegar, Glucose,	2
Vinegar, Malt,	7
Vinegar (no brand given),	1
Vinegar, Pickling,	2
Vinegar, Pineapple,	4
Vinegar, Red,	2
Vinegar, Rhine Wine,	1
Vinegar, Rex Amber Sugar,	1

SUMMARY—Continued.

Article	Number Analyzed
VINEGAR—Continued.	
Vinegar, Tarragon Flavor,	1
Vinegar, White,	16
Vinegar, White, distilled,	8
Vinegar, White Wine,	8
	371
MISCELLANEOUS PRODUCTS:	
Anchovy Paste,	1
Apples,	2
Baking Powder,	2
Canning Compound,	13
Chestnuts,	3
Cocoa,	4
Cocoanut, shredded,	1
Codfish Cakes,	3
Codfish Tablets,	1
Crisco,	1
Egg Macaroni,	2
Egg Noodles,	11
Egg Powder,	1
Glace Apricots,	1
Glace Fruit (no name given),	2
Ham Fat,	1
Health Bran,	1
Ice Cream Cones,	2
Jell-O-Cream Powder,	1
Jello Ice Cream Powder,	1
Jello Ice Cream Powder, Chocolate flavor,	1
Jello Ice Cream Powder, Lemon flavor,	1
Jello Ice Cream Powder, Strawberry flavor,	1
Jelly Powder,	1
Junket Tablets,	1
Lemons,	1
Macaroni,	4
Meat-O,	2
Mushroom Powder,	1
Paste, Lobster,	1
Paste, Tomato,	1
"Polly Whats,"	1
Pulp, Tomato,	5
Radishes,	1
Rice,	1
Snow Mello,	1
Spaghetti,	2
Sugar, granulated,	1
	81

RECAPITULATION.

Butter,	263
Cheese,	5
Cream,	1,025
Milk,	5,193
Cold Storage Products,	108
Eggs,	168
Fruit Syrups,	7
Ice Creams,	325
Lard,	10
Non-Alcoholic Drinks,	354
Oleomargarine,	65
Renovated Butter,	2
Sausage,	62
Vinegar,	371
Food,	981
	8,939

CASES TERMINATED

THE FOLLOWING TABLE GIVES A LIST OF ARTICLES ANALYZED BY CHEMISTS AND FOUND TO BE IN VIOLATION OF THE FOOD LAWS, AND THE NUMBER OF SAMPLES OF EACH PRODUCT ON WHICH PROSECUTIONS WERE BASED AND TERMINATED.

COFFEE AND CHICORY ACT, 1915, IN VIOLATION OF—

Coffee Compound, misbranded,	1
Eight O'clock Breakfast Mixture, containing cereals,	1
	2

COLD STORAGE ACT, 1913, IN VIOLATION OF—

Cold Storage Beef Livers, not properly marked,	1
stored beyond the legal limit,	1
Cold Storage Eggs, sold as and for fresh eggs,	5
not stamped as required by law,	63
stored beyond the legal limit,	1
Cold Storage Meat, stored beyond the legal limit,	1
Cold Storage Pig's Ears, not stamped as required by law,	1
Cold Storage Pork Loins, as chilled and not stamped as required by law,	1
Cold Storage Smelts, not stamped as required by law,	2
	76

EGG ACT, 1909, IN VIOLATION OF—

Eggs, frozen and canned, unfit for food purposes,	1
having in possession rotten eggs not properly denatured,	2
having in possession rots and spots not properly denatured,	1
stale eggs sold as fresh,	1
unfit for food purposes,	10
unfit for food purposes, to be used in bakery,	2
	17

FOOD ACT, 1909, IN VIOLATION OF—

Apricots, dried, contained sulphur dioxide,	10
Glace, contained sulphur dioxide,	4
Brazil Nuts and English Walnuts, unfit for food purposes,	1
Butter, contained an excessive amount of water,	1
Candy, contaminated and unfit for food,	1
Candy Fudge, coated with a resinous glaze,	6
assorted, coated with a resinous glaze,	1
Cake, (no name given), artificially colored in imitation of eggs,	2
Sponge, artificially colored in imitation of eggs,	1
Catsup, (no name given), adulterated,	1
contained an excessive amount of sodium benzoate,	2
Tomato, contained an excessive amount of sodium benzoate,	5
Cherries, canned, contained sulphur dioxide,	2
Cocktail, contained sulphur dioxide,	1
Maraschino, contained sulphur dioxide,	5
Chestnuts, unfit for human consumption,	1

CASES TERMINATED—Continued.

FOOD ACT, 1909, IN VIOLATION OF—Continued.

Chicken, unfit for food purposes,	1
Chocolate Almond Dates, misbranded,	1
Candy chicks, adulterated,	1
Candy, mixed, colored with coal tar color in imitation of chocolate,	1
Cocoa, powdered, decomposed and unfit for food purposes,	1
Cocoanut Bon Bons, contained cereals,	2
contained starch as a filler,	1
Squares, coated with a resinous glaze,	1
Coffee, adulterated,	4
contained chicory,	4
contained chicory and cereal,	1
Eggs, stale eggs sold as fresh eggs,	17
unfit for food purposes, using in bakery,	1
Egg Noodles, artificially colored in imitation of eggs,	1
Fish, unfit for food purposes,	2
Butter, unfit for food purposes,	1
Cod, contained an excessive amount of sodium benzoate,	2
Sea Bass, unfit for food purposes,	1
Shrimps, unfit for food purposes,	1
Flour, contained nitrites,	3
contaminated, unfit for food purposes,	1
Goat meat, sold as and for lamb,	1
Grapes, decomposed, unfit for food purposes,	1
Ham Fat, decomposed,	1
Hamburger Steak, contained sulphur dioxide,	1
Hickory Nuts, rancid and mouldy,	1
Honey, adulterated with glucose,	1
Licorice Candy Babies, adulterated,	1
contained no licorice,	1
Drops, adulterated,	1
Gum Drops, artificially colored and flavored,	1
Meat, decomposed,	2
diseased,	1
Milk, contained decomposed filth,	1
Olive Oil, adulterated,	1
consisting entirely of cotton-seed oil,	1
Orange Extract, adulterated,	1
Peaches, dried, contained sulphur dioxide,	47
Peas, canned, colored green with compound of copper,	2
Italian, colored green with compound of copper,	1
Spanish, wormy, unfit for food purposes,	1
Pickles, contained an excessive amount of sodium benzoate,	2
mixed, contained an excessive amount of sodium benzoate,	1
sweet, contained an excessive amount of sodium benzoate,	6
Pork Shoulders, decomposed,	1
Potatoes, decomposed, unfit for food purposes,	1
Rabbits and Muskrats, decomposed, putrid,	1
Raisins, contaminated, unfit for food purposes,	1
Raspberry syrups, adulterated,	1
Veal, immature,	2
	176

CASES TERMINATED—Continued.

ICE CREAM ACT, 1909, IN VIOLATION OF—

Ice Cream, Caramel, low in butter fat,	1
Chocolate, low in butter fat,	1
(no flavor given), low in butter fat,	2
Strawberry, low in butter fat,	5
Vanilla, low in butter fat,	32
	41

LARD ACT, 1909, IN VIOLATION OF—

Lard, adulterated,	3
consisting of cotton-seed oil and beef stearin; sold for pure lard,	2
not properly marked,	3
	8

MILK ACT, 1911, IN VIOLATION OF—

Cream, adulterated,	2
low in butter fat,	129
Milk, adulterated,	7
below legal standard,	15
below legal standard and partially skimmed,	1
below legal standard and watered,	6
containing formaldehyde,	1
low in butter fat,	65
low in butter fat and partially skimmed,	1
low in butter fat and total solids,	168
low in butter fat and total solids, partially skimmed,	11
low in butter fat and total solids, skimmed,	139
low in butter fat and total solids, watered,	41
low in total solids, watered,	13
low in butter fat and watered,	2
watered,	24
	625

NON-ALCOHOLIC DRINK ACT, 1909, IN VIOLATION OF—

Birch beer, artificially colored,	1
"Blackberry," an intoxicating drink sold for non-alcoholic drink,	1
"Cherry," an intoxicating drink sold for non-alcoholic drink,	1
Cider, artificially colored and flavored,	1
Champagne cider, misbranded, not champagne cider,	1
Pop, Strawberry, artifically colored and flavored,	4
misbranded,	1
Soda, Cherry, artifically colored,	2
artificially colored and misbranded,	1
Grape, misbranded, contained no grape, colored with coal tar dye,	1
Lemon, containing saccharin,	13
misbranded,	2
misbranded, contained no lemon juice,	3
Orange, containing saccharin,	1
misbranded,	10
misbranded, colored with coal tar dye,	3
Pineapple, containing saccharin,	2
Raspberry, artificially colored,	1

CASES TERMINATED—Continued.

NON-ALCOHOLIC DRINK ACT, 1909—Continued.

artificially colored and flavored,	2
artificially flavored,	1
misbranded,	1
misbranded contained no raspberry juice,	1
Strawberry, adulterated,	1
artificially colored and flavored,	2
artificially flavored,	5
containing saccharin,	11
misbranded, containing no strawberry juice,	3
	76

OLEOMARGARINE ACT, 1901, IN VIOLATION OF—

Oleomargarine, colored, sold as and for butter,	1
colored, sold without a license,	1
colored and served with meal,	1
colored and served in restaurant,	1
served in restaurant, no license,	2
served in boarding-house, no license,	1
served in hotel, no license,	2
sold as and for butter, no license,	1
sold at wholesale without a license,	1
sold at wholesale and peddling,	1
sold without a license,	4
	16

RENOVATED BUTTER ACT, 1901, IN VIOLATION OF—

Renovated butter, served without license,	2
	2

SAUSAGE ACT, 1901, IN VIOLATION OF—

Sausage, adulterated,	1
containing added water,	5
containing vegetable flour and added water,	1
decomposed,	1
beef, as and for pork sausage,	1
fresh, containing added water,	1
bologna, containing cereals,	1
pork, containing excess of water,	1
containing cereals,	2
containing cereals and added water,	1
containing added water, cereal and sulphur dioxide,	2
decomposed,	1
fresh, containing added sulphites,	1
containing added water,	4
unfit for food,	1
Vienna style, containing vegetable flour and added water,	1
	25

VINEGAR ACT, 1901, IN VIOLATION OF—

Vinegar, adulterated,	6
Amber, distilled and colored,	1
Apple, adulterated with water,	1

CASES TERMINATED—Continued.

VINEGAR ACT, 1901, IN VIOLATION OF—Continued.

Brown, adulterated,	1
distilled and artificially colored,	2
Cider, acetic acid and water, colored with caramel, below standard in acidity,	1
acetic acid and water, colored, as and for cider vinegar,	1
adulterated,	32
containing added water,	19
containing distilled vinegar,	1
consisting of distilled vinegar colored with caramel,	3
consisting entirely of distilled vinegar,	1
mixture of cider and cider vinegar,	1
Distilled, artificially colored,	3
artificially colored and low in acetic acid,	1
artificially flavored as and for pineapple vinegar,	1
as and for cider vinegar,	3
as and for pineapple vinegar,	1
colored as and for pineapple vinegar,	2
as and for white wine vinegar,	2
below standard,	1
below standard in acetic acid,	1
colored as and for cider vinegar,	8
Pineapple, artifically flavored, misbranded and colored,	2
Red, distilled and colored,	1
Rex amber, sugar vinegar for cider vinegar,	1
Syrup, as and for cider vinegar,	1
fermented as and for cider vinegar,	1
fermented, containing distilled vinegar,	1
White distilled vinegar below the standard,	1
	101

Total number of cases terminated,	1,165

RECEIPTS OF THE DAIRY AND FOOD BUREAU FROM JANUARY 1st TO DECEMBER 31st, 1915, INCLUSIVE

Oleomargarine License Fees,	$241,708 10
Milk Fines, Act of 1911,	14,218 35
Pure Food Fines,	6,945 60
Vinegar Fines,	3,712 90
Cold Storage License Fees,	3,650 00
Egg Fines,	1,675 00
Non-Alcoholic Drink Fines,	1,517 45
Sausage Fines,	1,340 60
Oleomargarine Fines,	1,120 00
Cold Storage Fines,	1,086 80
Ice Cream Fines,	960 00
Renovated Butter License Fees,	600 00
Lard Fines,	207 10
Renovated Butter Fines,	200 00
Fruit Syrup Fines,	63 50
Coffee and Chicory Fines,	50 00
Total receipts for the year,	$279,055 40

AMOUNTS EXPENDED FROM THE APPROPRIATION FOR THE MAINTENANCE OF THE WORK OF THE DAIRY AND FOOD BUREAU OF THE PENNSYLVANIA DEPARTMENT OF AGRICULTURE FOR THE YEAR 1915

Clerical and Stenographers,	$8,551 50
Special Agents' Salaries,	26,127 50
Attorneys, Assistants and special,	9,714 39
Chemists' Services and Expenses,	18,459 25
Enforcing Cold Storage Law,	8,246 23
Traveling and Agents' Expenses,	14,802 49
Total expenditures for the year,	$85,901 36

LEGAL OPINIONS

OFFICE OF THE ATTORNEY GENERAL,
Harrisburg, Pa., February 3, 1916.

Hon. James Foust, Dairy and Food Commissioner, Harrisburg, Pa.:

Sir: Your favor of January 25, requesting an opinion of this Department as to whether a merchant holding a license to sell oleomargarine at retail, can take orders for the product in cities and towns other than the one designated in the license, and fill such orders by delivering the product by vehicle or otherwise, is at hand.

The oleomargarine law of May 29, 1901, which was amended by the Act of June 5, 1913, P. L. 412, provides in Section 1.

"That no person, firm, or corporation shall, by himself, herself, or themselves, or by his, her or their agent or servant, nor shall any officer, agent, servant or employee of any person, firm or corporation, manufacture, sell, ship, consign, offer for sale, expose for sale, or have in possession with intent to sell, oleomargarine .... unless such person, firm or corporation shall have first obtained a license and paid a license fee as hereinafter provided."

Section 2 provides, in part:

"*That any person, firm, or corporation, and any agent of such person, firm or corporation, desiring to manufacture, sell or offer or expose for sale, or have in possession with intent to sell, oleomargarine, butterine, or any similar substance not made or colored so as to look like yellow butter, shall make application for a license so to do* in such form as shall be prescribed .... which application, in addition to other matters which may be required to be stated therein by the said Dairy and Food Commissioner, shall contain an accurate description of the place where the proposed business is intended to be carried on .... if the said application is satisfactory to said Dairy and Food Commissioner .... he shall issue to the applicant or applicants a license authorizing him, her, or them to engage in the manufacture or sale of oleomargarine ...... *such license shall not authorize the manufacture, sale, exposing for sale or having in possession with intent to sell, oleomargarine, butterine, or any similar substance, at any other place than that designated in the application and license.*"

Strictly construing the second section just quoted, it would seem to require a license not only from every person, firm or corporation engaged in the sale or manufacture but also from every agent of such person, firm or corporation, but the language of the first section indicates that when the license is obtained by a person, firm or corporation, such license shall authorize the agents, servants and employes thereof to manufacture and sell oleomargarine.

Under the provisions of this law it is clear that both the person and the place are licensed. It is also clear that oleomargarine could not be sold by an unauthorized person at an authorized place or by an authorized person at an unauthorized place. In order to bring the sale within the terms of the statute, it must be made by a person who has been licensed, through himself or his agent, and from a place which has been licensed. The license issued to a person, firm or corporation, does not authorize an itinerant business in oleomargarine. This act must be construed to carry out the Legislative intent. Manifestly one of the purposes of the Act was to have the oleomargarine business under the inspection and supervision of the Dairy and Food Commissioner. If a license were a roving commission to permit taking of orders in other cities and towns other than one designated in the license, it would make inspection or supervision by the Dairy and Food Commissioner extremely difficult.

If such a scheme could be followed, one person might take out one license for an entire county and transact his business by means of traveling agents taking orders therefor, or even extend such business into other counties.

It might be an unreasonable construction to hold that every clerk of a retail dealer who has a license to sell oleomargarine, must be also licensed because the act says that every agent of such person, firm or corporation desiring to manufacture, sell, offer or expose for sale, oleomargarine, shall make an application for a license so to do. Where a clerk or employee, in the regular course of his business is taking orders for other goods and along therewith, and as incident to such business takes orders for oleomargarine to be delivered with the other products, such transactions may fairly be covered by the retailer's license. On the other hand, it would be just as unreasonable, and do violence to the Legislative intent, to say that under this statute, a license to sell oleomargarine at retail, would permit the agents of the holder of the license to travel around into other cities and towns for the purpose of obtaining orders, even though the orders were to be filled by subsequent delivery from the place licensed. No such legislative intention can be gathered from this statute. The language is:

"Such licenses shall not authorize the manufacture or sale .... at any other place than that designated in the application and license."

To be more specific: If a retail merchant, who holds a retail oleomargarine license, has regular clerks taking orders for groceries, and orders for oleomargarine are taken along with other orders, by *such regular clerk or employee and the oleomargarine is marked and set apart and the name placed on each package, in the place licensed, and delivered as and when the other goods are delivered, such a transaction would be within the license of the retail dealer.*

It may be that there are retail dealers in cities whose regular trade extends into outlying districts. In such instances sales made, as above indicated, on orders taken in such territory, would be within the license.

But I am of opinion that a license to sell oleomargarine at retail does not give the holder thereof the right to send agents and canvassers to take orders, especially for oleomargarine, into territory into which the business of such retailer would not ordinarily extend, particularly into other cities and towns in which there are other similar licenses.

Very truly yours,

WM. M. HARGEST,

Deputy Attorney General.

OFFICE OF THE ATTORNEY GENERAL,

Harrisburg, Pa., November 19, 1915.

Hon. James Foust, Dairy and Food Commissioner, Harrisburg, Pa.:

Sir: Your favor of recent date was received. You propound the following question:

> "If a box containing two or more dozen bottles of catsup, properly sealed and labeled in conformity with the National Food and Drugs Act of June 30, 1906, and shipped from another state to a retail merchant in Pennsylvania, is opened and the bottles placed upon the shelves of the store for sale, and upon purchase by an agent of this Department and on analysis, the catsup is found to violate the Pure Food Laws of this State, can the Pennsylvania laws be enforced?"

With your request you submit a copy of a letter of the State Food and Drug Commissioner of Indianapolis and an opinion of the Attorney General of Indiana, all to the effect that there can be no interference with a grocer who sells to his customer a single bottle of catsup, if it complies with the National Food and Drugs Act, even though it violates the laws of the State, when such bottle of catsup was a part of a shipment from another state and originally packed in a larger case or box.

Your inquiry and the correspondence submitted are the result of a misconstruction of the case of *McDermott vs. Wisconsin, 228 U. S. 115, 57 Lawyers Edition 754.* The impression prevails since the opinion in that case, that a state cannot enforce its pure food laws against single, sealed packages of food misbranded or adulterated according to State laws, if such single packages comply with the provisions of the National Food and Drugs Act of June 30, 1906, (34 St. at Large, 768, Chapter 3915, U. S. Comp. Statt, Supp. 1911, page 1354). This impression is not justified by the decision itself. The precise questions in that case were,

First. Whether the word "package" as used in the Food and Drugs Act was limited to "original package" as understood in interstate commerce, or whether it included the goods upon the shelves of a local merchant for sale.

Second. Whether the Wisconsin law, which required the goods to contain the exclusive labels provided by that statute, and, in effect, prohibited the labels required under the National Food and Drugs Act, was beyond the power of the state to enforce.

The plaintiff in error, a retail merchant in Oregon, Wisconsin, was convicted of violating the Wisconsin statute because he had in his possession with intent to sell and offered for sale, "Karo Corn Syrup" which was not labeled according to the Wisconsin law providing that "the mixture or syrups designated in this section *shall have no other designation or brand than herein required,"* etc. He had purchased from wholesale grocers in Chicago twelve half gallon tin cans of Karo Corn Syrup, the shipments being made in wooden boxes containing the cans, and when the goods were received at the store, the cans were taken from the original boxes and placed on the shelves for sale, at retail. The cans were labeled in accordance with the National Pure Food and Drugs Act. That act provides, as stated in the opinion of McDermott vs. Wisconsin, page 130:

> "And as to food, if it shall be labeled or branded so as to deceive or mislead a purchaser, or purport to be a foreign product when not so, or, if the contents of the *package* as originally put up shall have been removed in whole or in part, and other contents placed in such *package;* or, if the *package* fail to bear a statement of the label as required, or, if in *package* form and the contents are stated in terms of weight or measure, and they are not plainly and correctly stated on the outside of the *package;* or, if the *package* containing it or its label contain any design or device regarding the ingredients or the substances contained therein which are false or misleading in character, the food shall be deemed misbranded."

The Court, speaking through Mr. Justice Day, said:

> "That the word 'package' or its equivalent expression, as used by Congress in sections 7 and 8 in defining what shall constitute adulteration and what shall constitute misbranding within the meaning of the act, clearly refers to the immediate container of the article which is intended for consumption by the public there can be no question. *And it is sufficient, for the decision of these cases, that we consider the extent of the word 'package' as thus used only, and we therefore have no occasion, and do not attempt, to decide what Congress included*

> *in the terms 'original unbroken package' as used in the second and tenth sections, and 'unbroken package' in the third section."* Within the limitations of its right to regulate interstate commerce, Congress is manifestly aiming at the contents of the package as it shall reach the customer, for whose protection the act was primarily passed, and it is the branding upon the package which contains the article intended for consumption itself which is the subject matter of regulation. Limiting the requirements of the act as to adulteration and misbranding simply to the outside wrapping or box containing the packages intended to be purchased by the consumer, so that the importer, by removing and destroying such covering, could prevent the operation of the law on the imported article yet unsold, would render the act nugatory and its provision wholly inadequate to accomplish the purpose for which it was passed."

The Court also said, page 135:

> "In the view, however, which we take of this case, it is unnecessary to enter upon any extended consideration of the nature and scope of the principles involved in determining what is an *original package.* For, as we have said, keeping within its Constitutional limitations of authority, Congress may determine for itself the character of the means necessary to make its purpose effectual in preventing the shipment in interstate commerce of articles of a harmful character, and to this end may provide the means of inspection, examination, and seizure necessary to enforce the prohibitions of the act."

And on page 136:

> "To determine the time when an article passes out of interstate into state jurisdiction for the purpose of taxation is entirely different from deciding when an article which has violated a Federal prohibition becomes immune. The doctrine (of original package) was not intended to limit the right of Congress, now asserted, to keep the channels of interstate commerce free from the carriage of injurious or fraudulently branded articles, and to choose appropriate means to that end. The legislative means provided in the Federal law for its own enforcement may not be thwarted by state legislation having a direct effect to impair the effectual exercise of such means."

The Court held that Congress could employ the means to keep interstate commerce free from misbranded articles, even to an inspection on the shelves of a retail grocer after the goods had been removed from the "original package," as known in interstate commerce.

The Court also held that a State statute which interfered with such supervisory power over the avenues of commerce was an excessive and illegal exercise of the State's power.

This is the full extent to which the case of McDermott vs. Wisconsin goes.

There is no Pennsylvania pure food statute which excludes, or requires the obliteration of, any labels placed on foods under the United States Food and Drugs Act, nor is there any Pennsylvania statute which interferes with the inspection by the Federal authorities of goods either in original packages, or upon the shelves of retail merchants.

The precise question then, is whether a Pennsylvania statute may be enforced even if its provisions go farther than the Federal law, but do not interfere with the operation of the Federal statute.

Referring again to the much discussed case of McDermott vs. Wisconsin, it is seen that the Court was careful to say in terms that the regulations of Congress would not prevent enforcement of similar regulations by a state for the protection of its people.

Mr. Justice Day said, page 131:

> "While these regulations are within the power of Congress, it by no means follows that the State is not permitted to make regulations, with a view to the protection of its people against fraud or imposition by impure food or drugs. This subject was fully considered by this court in Savage v. Jones, 225 U. S. 501, 56 L. Ed. 1182, 32 Sup. Ct. Rep. 715, in which the power of the state to make regulations concerning the same subject matter, reasonable in their terms, and not in conflict with the act of Congress, was recognized and stated, and certain regulations of the state of Indiana were held not to be inconsistent with the food and drugs act of Congress."

Again, on pages 133, 134:

> "*Conceding to the state the authority to make regulations consistent with the Federal law for the further protection of its citizens against impure and misbranded food and drugs,* we think to permit such regulation as is embodied in this statute is to permit a state to discredit and burden legitimate Federal regulations of interstate commerce, to destroy rights arising out of the Federal statute which have accrued both to the government and the shipper, and to impair the effect of a Federal law which has been enacted under the Constitutional power of Congress over the subject."

The essence of the decision is found in these words, pages 132-134:

> "To require the removal or destruction before the goods are sold of the evidence which Congress has by the food and drugs act, as we shall see, provided, may be examined to determine the compliance or non-compliance with the regulations of the Federal law, is beyond the power of the state. *The Wisconsin act which permits the sale of articles subject to the regulations of interstate commerce only upon condition that they contain the exclusive labels required by the statute is an act in excess of its legitimate power.*"

The question you propound is practically settled by the case of *Savage vs. Jones, 225 U. S. 501, 56 L. Ed. 1182.*

That was a suit to restrain the State chemist of Indiana from enforcing an act of that state relating to concentrated commercial feeding stuffs. It was alleged that the Indiana act which required certain labels to be affixed to the package, disclosing in part the ingredients and also required that certain stamps, purchased from the state chemist, should be attached as an inspection fee, interfered with interstate commerce and also because Congress had legislated upon the subject by the National Food and Drugs Act, its jurisdiction was exclusive, and therefore the Indiana Act could not be enforced as to packages received from outside the state and sold by the importing purchaser in the same packages.

The court held that the act was not an unconstitutional regulation of interstate commerce, and also, as stated in the syllabus in 56 Law. Ed. 1183, that:

> "Congress did not by the passage of the Food and Drugs Act of June 30, 1906, for the prevention of adulteration and misbranding of foods and drugs when the subject of interstate commerce preclude the enactment of the Indiana Act prohibiting sales of concentrated commercial feeding stuffs *in the original packages*, unless there be a compliance as to inspection and analysis and the disclosure of ingredients * * * * * * * and with its incidental provision for the filing of a certificate, for registration, and for labels and stamps."

Mr. Justice Hughes, writing the opinion of the Court, said, page 524:

> 'The State cannot, under cover of exerting its police powers, undertake what amounts essentially to a regulation of interstate commerce, or impose a direct burden upon that commerce." (citing many authorities).
>
> *"But when the local police regulation has real relation to the suitable protection of the people of the State, and is reasonable in its requirements, it is not invalid because it may incidentally affect interstate commerce, provided it does not conflict with legislation enacted by Congress pursuant to its constitutional authority."* (Citing many authorities).

And on page 526, quoting from *Plumley vs. Mass., 155 U. S. 461*, he said:

> "Such legislation may, indeed, directly, or incidentally affect trade in such products transported from one state to another state. But that circumstance does not show that laws of the character alluded to are inconsistent with the power of Congress to regulate commerce among the several states."

Again, on page 529:

> "The object of the food and drugs act is to prevent adulteration and misbranding, as therein defined. It prohibits the

> introduction into any state from any other state "of any article of food or drugs which is adulterated or misbranded, within the meaning of this act." The purpose is to keep such articles 'out of the channels of interstate commerce, or, if they enter such commerce, to condemn them while being transported or when they have reached their destinations, provided they remain unloaded, unsold, or in original unbroken packages.' "

And on page 532:

> *"Can it be said that Congress, nevertheless, has denied to the state, with respect to the feeding stuffs coming from another state and sold in the original packages, the power the state otherwise would have to prevent imposition upon the public by making a reasonable and non-discriminating provision for the disclosure of ingredients, and for inspection and analysis? If there be such denial it is not to be found in any express declaration to that effect. Undoubtedly Congress, by virtue of its paramount authority over interstate commerce, might have said that such goods should be free from the incidental effect of a state law enacted for these purposes. But it did not so declare."*

In the case of *Simpson vs. Sheperd, 230 U. S. 352, 57 L. Ed. 1511*, the Court said:

> "State inspection laws and statutes designed to safeguard the inhabitants of a state from fraud and imposition are valid when reasonable in their requirement, and not in conflict with Federal rules, although they may affect interstate commerce in their relation to articles prepared for export, *or by including incidentally those brought into the state and held for sale in the original imported packages."*

If the state can, as decided in Savage vs. Jones, require an additional label disclosing ingredients and also stamps covering cost of inspection *to be attached to the original package,* without unconstitutional interference with interstate commerce, or with the operation of the National Food and Drugs Act, it certainly can enforce its own laws when food in violation thereof is offered for sale by a citizen of the state to other citizens of the state, even though the food was imported from another state.

It is therefore clear that the pure food statutes of the State of Pennsylvania which do not interfere with the labeling provided by the National Food and Drugs Act, or with the inspection of the Federal authority under that act, do not even incidentally interfere with interstate commerce.

There is another consideration. The enforcement of the pure food laws of the State practically begins where the Federal control ends.

In the case of McDermott vs. Wisconsin, it is said in the opinion, page 136:

> "To make the provisions of the act effectual, Congress has

> provided not only for the seizure of the goods while being actually transported in interstate commerce, but has also provided for such seizure after such transportation and while the goods remain 'unloaded, unsold or in original and unbroken packages.' The opportunity of inspection enroute may be very inadequate. *The real opportunity of government inspection may only arise when, as in the present case, the goods as packed have been removed from the outside box in which they were shipped, and remain, as the act provides, 'unsold. It is enough, by the terms of the act, if the articles are unsold, whether in original packages or not."*

The Pennsylvania statutes usually contain the language making it illegal to "sell, offer for sale, expose for sale or have in possession with intent to sell," any adulterated or misbranded article of food.

The Federal statute follows the goods from another State into Pennsylvania and on to the shelves of the retail merchant. When the goods get upon the shelves of the retail merchant the State inspection begins. There is no conflict of authority. The enforcement of Pennsylvania laws against goods on shelves of a retail merchant, is not even an incidental control of interstate commerce, nor is it any interference with Federal inspection.

I am aware that this opinion does not appear to be in harmony with the case of *Corn Products Refining Company vs. Weigle, 221 Federal Reporter, 998,* and the decree entered in that case which is before me, but not reported, certainly is not in harmony with this opinion, but there is no case in the United States Supreme Court which has gone to the length of the case just quoted, and, as I understand the decisions of that Court, the case of Corn Products Refining Company vs. Weigle has gone farther than any other case in that it completely ousts state inspection of goods that were once in interstate commerce, if such goods happen to be labeled in conformity with the National Food and Drugs Act, and prevents the operation of any state statute upon such goods, even as between a retail resident dealer and the resident consumer of the state. I cannot agree that the passage of the National Food and Drugs Act has such sweeping effect in destroying the police power of the state.

Therefore, specifically answering your inquiry, I am of opinion that after purchase and analysis of a bottle of catsup from the shelves of a store of a retail merchant in Pennsylvania, such catsup is found to violate the pure food laws of this State, such laws may be enforced even though the catsup has been shipped from another state and is sealed and labeled in conformity with the National Food and Drugs Act of June 30, 1906.

I return herewith the correspondence submitted with your request.

Very truly yours,

WM. M. HARGEST,
Deputy Attorney General.

REPORT OF STATE VETERINARIAN AND STATE LIVE-STOCK SANITARY BOARD FOR 1914 AND 1915

Harrisburg, Pa., January 1, 1916.

Owing to the extensive outbreak of foot-and-mouth disease that occurred in the fall of 1914 and continued up through the first part of the following year, it was not possible to get out the report for 1914, or to divide the report of the work done on foot-and-mouth disease during the two years. It was, therefore, considered advisable to combine the two reports for 1914 and 1915.

There have been some changes in the Board during the time. Ex-Governor John K. Tener was President of the Board up to January, 1915. At that time he was succeeded by Governor Martin G. Brumbaugh. Former Secretary of Agriculture, Hon. N. B. Critchfield, was a member of the Board up to October 15, 1915, when he was succeeded by Hon. Charles E. Patton. The latter was elected Vice-President of the Board on December 15, 1915.

The work was handled as in other years under six divisions, as follows: Meat Hygiene, Horse Breeding and Management of Farm, Transmissible Diseases, Laboratory and Investigation, Milk Hygiene, Auditing.

T. E. Munce, Deputy State Veterinarian, directed the work of Meat Hygiene up to August, 1915. At that time S. E. Bruner was given charge of this work and tuberculin testing.

Horse Breeding and Management of the State Farm was in charge of Carl W. Gay. It was necessary during the year to dispose of the herd of reacting cattle that had been kept under investigation for several years. Most of the work at the farm was for the purpose of producing hog cholera serum to be used in the State.

R. M. Staley had charge of the work of handling transmissible diseases. There was no change in reference to this work with the exception of that made necessary to control the unusual outbreak of foot-and-mouth disease.

J. B. Hardenbergh continued in charge of the Laboratory, and, as in previous years, his work was devoted principally to preparing such biological products as tuberculin, mallein, anthrax vaccine, etc., also in laboratory investigations of such diseases as rabies, glanders, abortion and many others in which it was difficult and impossible to make a diagnosis in the field.

W. S. Gimper continued the work of Milk Hygiene. In former years Dr. Gimper had charge of tuberculin testing and milk hygiene. It was found that the tuberculin testing would go better with the Division of Meat Hygiene for the reason that animals condemned for tuberculosis are killed under inspection.

It has been necessary in the past few years to bring prosecutions against persons violating our laws. It required much work to investigate these cases and see that the evidence is properly collected and arranged in such form that it may be given over to the District Attorney for prosecution. This work has been assigned to Dr. Gimper in addition to the work of Milk Hygiene.

In connection with the work of Milk Hygiene, many local Boards of Health have desired laboratory assistance. L. A. Klein, Dean of the Veterinary School, University of Pennsylvania, has continued his services without expense to the Board along this line. Much valuable information has been obtained in reference to Milk Hygiene in this way.

The Board is charged with the enforcement of the laws pertaining to Meat Hygiene, stallion registration and transmissible diseases of animals. These subjects are all managed from the central office, but the work in the field is divided into ten districts with a man in charge of each. Any trouble that occurs in his territory is handled by him or referred to the central office for adjustment. It has been found that much better results can be obtained by men familiar with the territory, the characteristics of the people and the nature of diseases most prevalent in that section.

The Board had a great deal of work at Pittsburgh and vicinity. For this reason it was found necessary for the past few years to maintain an office at the Pittsburgh Union Stockyards. Up to August, 1915, this work was in charge of P. K. Jones, who was succeeded at that time by H. W. Turner. Much of the work at the stockyards has to do with handling interstate shipments.

The following is a statement of the number of animals received and ante-mortem examinations made at the Pittsburgh Union Stockyards from August 15, 1915, to January 1, 1916:

Cattle,	48,316
Hogs,	443,721
Sheep,	171,190
Calves,	18,087
	681,314

Another office is maintained at the Lancaster Stockyards. This work is in charge of Joseph Johnson.

D. E. Hickman, West Chester, has charge of our work in the southeastern part of the State. Otto G. Noack, Reading; H. R. Church, Wilkes-Barre; A. O. Cawley, Lewisburg; M. P. Hendrick, Meadville; Ira Mitterling, Hollidaysburg, and John H. Turner, Wellsboro, have charge of the work in their respective districts.

It is believed that an ideal arrangement for handling the work of the Board would be to have such an agent in each county. Under the present arrangement the territory is too large. However, the general plan is working out satisfactorily and in the future it may be possible to divide the State into smaller areas and thereby obtain more efficient service.

The Auditing Division was in charge of M. C. Butterworth.

MEAT HYGIENE.

The Act of Assembly, approved May 25, 1907, P. L. 187, was the first Meat Hygiene law placed upon the statute books of any state. It was changed while going through the Legislature and lost many of the essential features contained in the original bill. It was a beginning, however, and an effort was made to enforce it. It did not require long to find out that it was weak, nevertheless, much good was accomplished in its enforcement.

Nothing was done in the way of new legislation for the succeeding five years, for the reason that it was desired to give the law a thorough trial and study the subject of Meat Hygiene legislation from a practical point of view and collect information that would be useful in drawing a new law. The data was gathered and incorporated into a bill which was presented to the 1913 Legislature, but failed of passage by a few votes. Practically the same bill was introduced and passed the 1915 Legislature and was approved by the Governor, May 28, 1915. It is under this law we are now working.

It is still the only state Meat Hygiene law in this country and about as fair and practical as can be drawn to take care of all branches of the business. There are just as many straight going, conscientious men engaged in the meat business as there are in other lines of trade.

A just Meat Hygiene law should give as much protection to the honest and tidy butcher as it does to the public which uses the meat. Honest meat dealers do not place on the market diseased or unwholesome meat, neither do they keep their establishments dirty. The honest, clean class of butchers do not have to be watched to keep them going right. In the meat trade there is a class of unscrupulous, untidy, careless fellows as there is in other forms of industry. It is against this class that the consuming public and the reliable dealer must be protected. The man who tries to do right, invests capital in making improvements and installing up-to-date equipment that can be easily kept clean, should not be compelled to compete with those who are unequipped, unscrupulous and slovenly. Working with this idea in view, the new law was constructed.

It defines what constitutes an establishment. This is important for the reason that the question is sometimes raised as to whether this kind of wagon or that kind of structure, and how much ground adjacent, are subject to the provisions of the law.

It was an established practice, particularly in the rural sections, for butchers to keep hogs around the slaughter houses to eat the offal. Some places were so conveniently arranged that the offal was shoved out of the back door where the hogs were waiting to receive it. Hogs were allowed to wallow under the slaughter house.

A hole was provided in the killing room floor through which the offal was pushed to the hogs below. This was a simple and inexpensive, yet insanitary contrivance for taking care of the by-products. It is now unlawful to feed offal within two hundred feet of a slaughter house.

All meat dealers have been more or less annoyed by prospective purchasers touching and handling meat displayed for sale. It took a tactful butcher to correct such an abuse without offending his customers. This act makes it unlawful for customers to touch or handle meat displayed for sale. It goes farther and requires meat to be screened against flies and animals.

An investigation was recently made of the meat stands at five city market houses, and not a single stand was equipped with screens. A public meeting was arranged with the butchers at which this subject and other pertinent matters were discussed. The result has been that practically every stand in the city is now provided with screens. A move of this kind has been started at Harrisburg, Lancaster, York, Altoona, Williamsport, Columbia, Hanover Curb Market, Sunbury, Mt. Joy, Lebanon, Chambersburg and Waynesboro, and will be started soon in other places.

Complaints have been received from citizens that certain persons gather up dead animals and feed them to hogs. Under the old law there was no way to stop it so long as evidence was lacking that the animals had died from dangerous disease.

The present law makes it a misdemeanor to place on the market meat from hogs to which have been fed dead animals.

It formerly required more time and expense to close an unsatisfactory slaughter house or meat market. It can now be done in a few days. By simplifying the procedure and shortening the time for closing them every interest concerned is benefited. The owner of the plant is helped because he knows what has to be done and the length of time he has in which to do it. His competitor is assisted for the reason that he is not obliged to compete indefinitely with the careless slovenly fellow. The State is benefited because it saves time and money, and the public is the gainer because what is beneficial to the three interests, is good for it.

The new law covers such matters as sanitation, the sale of diseased and unwholesome meat, the appointment of agents, defines their duties and provides for the adoption of regulations.

Our agents are not expected to go about as policemen and detectives or to be compelled to resort to gum shoe methods while doing their work. It is desired that they act in the capacity of advisors to spread the gospel of sanitation and show the difference between diseased and wholesome meat and a sound product, and the dangers that result from the lack of sanitation.

We aim to encourage co-operation between the meat merchants and those charged with the enforcement of the laws, and to discourage the practices that lead to prosecution.

About one-half of the meat placed upon the public market in Pennsylvania is inspected by the Federal, State or municipal governments. The remainder is slaughtered under varying conditions without inspection. In ten months the ten State agents condemned 540 whole carcasses, 9,851 organs, such as livers, hearts, etc., and almost 6,000 pounds of meat and meat products. If a small force of men find in the large and scattered territory such an amount of diseased and unwholesome meats, there must be much more sold without inspection that should be condemned.

The State constitution gives cities and boroughs authority to establish and maintain a system of meat inspection. Much attention has been given the subject of a form of inspection for municipal authorities and local Boards of Health that would give the most satisfaction with the least expense. In practically every instance it has been recommended that each city or borough should establish its own inspection. After a trial of the various systems it has been determined that the most practical and economical plan is a public abattoir at which all slaughtering can be done under proper inspection. This would give the municipality control over its meat supply.

Unfortunately many towns have a limited water supply and an inadequate sewage disposal system, and the local officials in many places where such necessities are provided have adopted ordinances and regulations which forbid the erection and operation of a slaughter house within the city or borough limits. The butcher is thus compelled to go outside of town and conduct his business away from water and sewer connections. In such cases he selects the best site available which is usually in some out of the way place. The location of his slaughter house may be near a creek or a spring where he can get a limited amount of water to practically cleanse the carcasses, but it is seldom sufficient to do a thorough job or to properly cleanse the slaughter room. He is unable to obtain proper drainage and a sanitary disposal of the refuse and offal is difficult or impossible. Operating under such conditions and without proper supervision there is always a temptation to keep hogs to eat the offal. This plan is not only insanitary but is bad economy for the reason that many such hogs develop cholera, tuberculosis, etc. The contents of the stomach and intestines are often placed in a pile close to the slaughter house where it makes a bad smell and an ideal breeding place for flies, and other bacteria carrying insects.

A copy of the new law has been mailed to each butcher in the State, calling attention to sections 3, 6, 9 and 10. A placard which reads as follows was also sent:

"The Touching or Handling of Meats and Meat Products by Prospective Purchasers and Other Unauthorized Persons is Prohibited by Law under Penalty of Fine and Imprisonment."

The rules and regulations are being revised to conform with the new law and will be ready for distribution in the near future.

The new Meat Hygiene law is working well and the further we proceed with it the more evident is the necessity for it.

The following is a summary of the animals, products and establishments examined during the two years:

ANIMALS, PRODUCTS AND ESTABLISHMENTS EXAMINED DURING 1914 AND 1915.

	1914	1915
Number of animals examined:		
Cattle,	5,835	2,791
Sheep,	1,531	616
Swine,	5,256	2,188
	12,622	5,595
Number of animals quarantined:		
Cattle,	148	
Swine,	72	
	220	
Number of carcasses examined:		
Cattle,	19,499	13,740
Sheep,	5,089	4,272
Swine,	15,755	11,142
	40,343	29,154
Number of carcasses condemned:		
Cattle,	453	204
Sheep,	44	14
Swine,	43	872
	540	1,090
Number of organs examined,	52,932	33,734
Number of organs passed,	43,078	29,499
Number of organs condemned,	9,854	4,235
Meat and Meat Products examined,	1,383,514 lbs.	819,739 lbs.
Meat and Meat Products passed,	1,377,632 lbs.	811,225 lbs.
Meat and Meat Products condemned,	5,882 lbs.	8,514 lbs.

Counties.	SLAUGHTER HOUSES.			MEAT MARKETS.		
		Number Defective.			Number Defective.	
	Number examined.	On first re-examination.	On subsequent re-examinations.	Number examined.	On first re-examination.	On subsequent re-examinations.
Adams,	21	4	0	12	0	0
Allegheny,	112	10	1	556	50	4
Armstrong,	47	10	1	124	19	0
Beaver,	74	5	3	132	10	0
Bedford,	85	3	2	129	8	0
Berks,	67	3	0	34	1	0
Blair,	473	2	0	552	2	0
Bradford,	33	2	2	48	3	0
Bucks,	24	2	0	31	0	0
Butler,	60	5	0	96	1	0
Cambria,	383	17	1	723	143	1
Cameron,	0	0	0	11	0	0
Carbon,	5	0	0	22	1	0
Centre,	38	3	0	66	0	0
Chester,	66	2	0	32	6	0
Clarion,	11	4	1	59	4	0
Clearfield,	32	6	0	140	4	0
Clinton,	8	1	0	84	0	0
Columbia,	26	0	0	86	0	0
Crawford,	19	0	0	42	0	0
Cumberland,	1	0	0	0	0	0
Dauphin,	56	1	1	84	1	0
Delaware,	47	1	0	104	5	0
Elk,	5	0	0	55	0	0
Erie,	96	0	0	39	1	0
Fayette,	57	5	0	268	6	0
Forest,	4	0	0	18	0	0
Franklin,	50	17	0	79	35	0
Fulton,	4	3	0	1	1	0

Counties.	SLAUGHTER HOUSES.			MEAT MARKETS.		
		Number Defective.			Number Defective.	
	Number examined.	On first re-examination.	On subsequent re-examinations.	Number examined.	On first re-examination.	On subsequent re-examinations.
Greene,	11	0	0	19	0	0
Huntingdon,	25	3	0	86	6	0
Indiana,	18	0	0	11	0	0
Jefferson,	30	2	0	130	0	0
Juniata,	11	0	0	10	0	0
Lackawanna,	19	3	1	97	4	0
Lancaster,	423	27	0	276	8	0
Lawrence,	15	3	0	132	4	0
Lebanon,	102	9	0	85	11	0
Lehigh,	32	8	0	62	7	0
Luzerne,	78	2	1	280	1	0
Lycoming,	68	3	0	116	0	0
McKean,	8	0	0	57	0	0
Mercer,	23	3	0	132	1	0
Mifflin,	18	0	0	48	0	0
Monroe,	1	0	0	9	0	0
Montgomery,	192	6	1	200	14	0
Montour,	13	0	0	35	0	0
Northampton,	43	3	1	102	2	0
Northumberland,	134	9	2	448	0	0
Perry,	15	0	0	18	0	0
Philadelphia,	1	0	0	0	0	0
Pike,	4	0	0	3	0	0
Potter,	22	0	0	13	0	0
Schuylkill,	49	5	1	238	21	0
Snyder,	21	1	0	18	0	0
Somerset,	80	6	0	176	1	0
Sullivan,	4	0	0	7	0	0
Susquehanna,	23	1	0	23	0	0
Tioga,	60	3	0	56	0	0
Union,	49	1	0	60	0	0
Venango,	8	0	0	82	1	0
Warren,	14	0	0	55	0	0
Washington,	23	1	0	93	0	0
Wayne,	20	1	0	16	0	0
Westmoreland,	126	5	0	377	1	0
Wyoming,	6	1	0	6	0	0
York,	165	23	0	131	37	0
	3,858	235	19	7,334	420	5

*Slaughter houses and meat markets in Allegheny county outside of Pittsburgh. No general examination was made of slaughter houses and meat markets in Philadelphia, Reading, Harrisburg, Ellwood City, Bristol, Phoenixville and Nanticoke.

HORSE BREEDING

This is the eighth season of licensing stallions in Pennsylvania and a review of what has been accomplished in that time brings forward some significant facts. The following tables not only cover the past year's work in the administration of the Horse Breeding law, but report as well the seven years preceding. They present the data of each year in a comparative arrangement, the deductions from which are very conclusive on certain points, viz:

1. The total number of stallions standing for service in the State remained remarkably constant while the number of pure-bred, registered stallions has increased 57.35 per cent. Our contention has

always been that the number of stallions was ample to meet breeders' requirements, but that qualitative rather than quantative improvement was what we needed.

2. The steady and very material increase in the two leading draft breeds with a corresponding reduction in the number of light stallions is highly indicative of the fact that Pennsylvania farmers are falling into line with the rank and file of American farmers who have come to recognize the draft horse as the best proposition for the average farm breeder.

There is unmistakable evidence of the trend of the market in these figures. Those breeders who exercised foresight and read these signs in advance are in the best position to profit by horse raising today.

The relative popularity of the different breeders is not altogether a matter of fad and fancy and the Pennsylvania breeder has very markedly placed his stamp of approval on certain breeds. Percherons have made a steady increase year by year and have more than doubled in numbers, having led all breeds originally. Belgians, while numerically less, have made an even greater proportionate gain, increasing from 35 in 1908 to 124 in 1915. Standardbreds, second to Percherons in the beginning, touched their mark of 293 in 1911 and have since gradually declined to 211 as against 209 in 1908. Hackneys have just held their own until the past season, while Thoroughbred and Saddlebred stallions have each shown a substantial percentage, though, not numerical, increase. This is a good sign in view of the present active demand for saddle horses.

TABLE SHOWING NUMBER AND CLASSES OF LICENSES ISSUED IN PENNSYLVANIA FROM 1908 TO 1915 INCLUSIVE.

Year.	Registered.	Unregistered.	Total Number Licensed.
1908,	666	1,350	2,016
1909,	823	1,427	2,254
1910,	908	1,477	2,385
1911,	951	1,480	2,431
1912,	954	1,390	2,344
1913,	981	1,332	2,313
1914,	1,029	1,327	2,356
1915,	1,048	1,210	2,258

A COMPARATIVE EIGHT YEAR TABLE SHOWING THE NUMBER OF REGISTERED STALLIONS OF EACH BREED LICENSED IN PENNSYLVANIA.

Breed	1908	1909	1910	1911	1912	1913	1914	1915
Percheron,	252	290	315	354	372	416	459	518
Standardbred,	209	253	289	293	267	266	248	211
Non-Standardbred,	....	....	....	....	......	....	8	5
Belgian,	35	48	66	70	74	90	108	124
Shire,	33	43	43	44	35	30	27	30
German Coach,	23	36	46	40	40	36	31	33
French Draft,	29	33	20	30	31	34	38	31
Hackney,	23	29	26	29	23	27	28	22
Clydesdale,	19	20	33	26	23	20	22	20
French Coach,	15	24	25	25	14	8	10	8
Thoroughbred,	5	10	10	12	11	14	13	14
Morgan,	11	11	9	13	11	13	12	10
Saddle,	5	6	7	5	8	8	8	10
Cleveland Bay,	3	5	3	2	2	2	2	1
Shetland,	3	2	3	2	3	3	9	5
Suffolk,	0	1	1	1	1	0	0	0
Yorkshire,	1	1	1	1	0	0	0	0
Orloff,	0	1	1	1	0	0	0	0
Welsh,	0	0	1	1	0	0	0	0
Arabian,	0	0	0	1	1	1	0	0
Jack,	0	0	0	1	2	2	4	6
	666	823	908	951	923	978	1,029	1,048

FARM, 1914.

Some changes in the farm practice have been made during the past year with the view of producing as nearly as possible all feed required. To this end there has been more ground devoted to corn and alfalfa, necessitating only the purchase of middlings, cotton seed and a part of the oat supply.

Summer silage has been substituted for soilage to supplement our insufficient pastures, thereby effecting much saving of labor.

Following is an inventory of livestock and farm crops, December 31, 1914.

Livestock	Farm Crops		
12 horses	Field corn	1,800 bu.	20 acres
2 mules	Alfalfa	150 tons	40 acres
37 cows	Silage corn	250 tons	22 acres
4 bulls	Wheat	375 bu.	16 acres
4 heifers	Oats	410 bu.	16 acres
8 bull calves	Timothy	16 tons	16 acres
15 brood sows	Mixed meadow	32 tons	16 acres
77 shoats	Cabbage	7,000 head	1 acre
2 boars	Potatoes	100 bu.	1 acre
25 chickens	Carrots	375 bu.	1 acre
goats	Mangels	250 bu.	1 acre
rabbits	Turnips	60 bu.	1 acre
guinea pigs	Pasture		1 patch
			20 acres

Milk produced 465.6 lbs. average per day.

FARM, 1915.

During the past year it was decided to make the support of the Hog Cholera Vaccine plant the chief function of the farm, and to that end the herd of cattle, all but eight cows, was disposed of. This necessitated some changes in the crop scheme and interrupted the six course rotation which we have been following. Plans for the coming season include increasing the acreage devoted to alfalfa, root crops and soy beans.

On the basis of the value of the hog cholera vaccine produced, although the same was distributed free of charge, the farm has earned $4,840.25, as shown by the following statement:

FARM, 1915.

Statement showing the actual cash expenditure for the State Farm, at Media, as well as credits to the farm during the year, together with the crop inventory taken at end of the year.

EXPENDITURES, 1915

Feed,	$2,024 20
Salaries, expenses, labor,	4,701 72
Livestock,	716 41
Gasoline and coal,	64 51
Bedding,	92 00
Supplies,	1,208 47
Equipment, repairs, improvements,	402 27
Seed,	240 32
Freight and express,	347 66
Miscellaneous,	735 23
Total,	$10,532 79

CREDITS, 1915

Hog cholera serum produced 606,900 cc at 1½c. cc,	$9,103 50
Feed for animals used by Laboratory for experimental purposes,	416 00
Animals furnished laboratory,	
313 guinea pigs at 75c. per pr.,	117 37
81 rabbits at $1.25 per pr.,	50 67
5 calves at $15.00 each,	75 00
6 chickens,	4 50
Crops on hand Dec. 31st, 1915:	
100 bu. corn at 85c.,	850 00
340 bu. wheat at $1.35 per bu.,	459 00
25 bu. oats at 56c. per bu.,	14 00
40 tons hay at $19.00,	760 00
64 tons alfalfa at $24.00 per ton,	1,536 00
10 tons soilage at $3.00 per ton,	30 00
80 tons ensilage at $3.00 per ton,	240 00
4500 bundles corn stover,	180 00
637 tons manure,	637 00
Cash credit at D. B. Martin & Co., Philadelphia,	900 00
Total of credits,	$15,373 04
Less expenses,	10,532 79
Apparent gain,	$4,840 25

LABORATORY, 1914.

The following statements are interesting from the fact that they show what the people of Pennsylvania would have had to pay for the Biological Products furnished them, together with the diagnosis work given them from the Laboratory of the State Livestock Sanitary Board as well as the actual cost of maintaining the Laboratory to the State of Pennsylvania.

EXPENSES

Salaries,	$11,006 42
Expenses,	261 09
Books and magazines	172 12
Animals,	312 38
Feed,	65 19

Bedding,	130 90
Freight and express,	325 13
Heat and light,	692 01
Supplies,	1,831 89
Equipment and repairs,	266 57
Miscellaneous,	389 36

Furnished the Laboratory from the State Farm

400 guinea pigs at 75c. pr.,	300 00
100 rabbits at $1.25 pr.,	62 50
8 calves at $15.00 each,	120 00
10 chickens at 75c. each,	7 50
Boarding animals kept at the farm for experimental purposes,	500 00
Total,	$16,443 06

BIOLOGICAL PRODUCTS, EXAMINATIONS MADE AND DIAGNOSES FURNISHED WITH ESTIMATED VALUE

Mallein (Subcutaneous), 280 doses at 25c.,	$70 00	
Mallein (Ophthalmic), 6,000 doses at 27c.,	1,620 00	
Tuberculin (Subcutaneous), 63,350 doses at 14c.,	8,869 00	
Tuberculin (Retests), 2,586 doses at 50c.,	1,293 00	
Tuberculin (Intradermal), 1,260 doses at 10c.,	126 00	
Anthrax Vaccine (No. 1, No. 2), 1,469 doses at 20c.,	293 80	
Products—Estimated value,		$12,271 80
326 cow sera at $5.00,	$1,630 00	
2435 horse sera at $5.00,	12,175 00	
413 rabies at $10.00,	4,130 00	
51 hog cholera at $2.00,	102 00	
31 tuberculosis at $5.00,	155 00	
24 anthrax at $2.00,	48 00	
29 infectious abortion at $5.00,	145 00	
203 fowl at $5.00,	1,015 00	
23 parasites at 2.00,	46 00	
55 miscellaneous at $5.00,	275 00	
6 tumors at $2.00,	12 00	
Diagnoses and examination—Estimated value,		19,733 00
Total of estimated values,		$32,004 80
Less expenses,		16,443 06
A saving to the people of Pennsylvania,		$15,561 74

LABORATORY 1915

EXPENSES

Salaries,	$9,490 50
Expenses,	83 65
Books and magazines,	104 52
Animals,	152 60
Feed,	135 83
Bedding,	13 19
Freight and express,	286 06
Heat and light,	653 84
Supplies,	2,244 20
Equipment and repairs,	82 62
Miscellaneous,	270 31

Furnished the Laboratory from the State Farm

313 guinea pigs at 75c. pr.,	117 37
81 rabbits at $1.25 pr.,	50 67
5 calves at $15.00,	75 00
6 chickens at 75c.,	4 50
Boarding animals kept for experimental purposes at State Farm,	416 00
Total,	$14,180 86

BIOLOGICAL PRODUCTS, EXAMINATIONS MADE AND DIAGNOSES FURNISHED, WITH ESTIMATED VALUE

Mallein (Subcutaneous), 280 dozes at 25c.,	$70 00	
Mallein (Ophthalmic), 10,000 doses at 27c.,	2,700 00	
Tuberculin (Subcutaneous), 42,025 doses at 14c.,	5,883 50	
Tuberculin (Retests), 3,400 doses at 50c.,	1,700 00	
Tuberculin (Intradermal), 1,500 doses at 10c.,	150 00	
Anthrax Vaccine (No. 1, No. 2), 1,636 doses at 20c.,	327 20	
Products—Estimated value,		$10,830 70
388 cow sera at $5.00,	$1,940 00	
2512 horse and mule sera at $5.00,	12,560 00	
295 heads for rabies at $10.00,	2,950 00	
48 hog cholera at $2.00,	96 00	
20 tuberculosis at $5.00,	100 00	
15 anthrax at $2.00,	30 00	
8 infectious abortion at $5.00,	40 00	
66 fowl and quail diseases at $5.00,	330 00	
42 parasites at $2.00,	84 00	
165 miscellaneous at $5.00,	825 00	
20 miscellaneous at $2.00,	40 00	
6 tumors a $2.00,	12 00	
Diagnosis and examinations—Estimated value,		$19,007 00
Total of estimated values,		$29,837 70
Less expenses,		14,180 86
A saving to the people of Pennsylvania,		$15,656 84

TRANSMISSIBLE DISEASES

The most important work of the Board is to control the transmissible diseases of animals. The following are the diseases which are reportable under the law: Glanders, anthrax, blackleg, contagious pleuro-pneumonia of cattle, rinderpest, hemorrhagic septicemia, foot-and-mouth disease, Texas fever, sheep scab, mange in cattle and horses, hog cholera, fowl cholera, rabies, dourine of horses, generalized tuberculosis and tuberculosis of the udder.

Assistance was given wherever possible in reference to handling other diseases. Veterinarians are required by law to report the above diseases.

The Board is charged with certain prescribed duties for admitting livestock from other states. These requirements under ordinary conditions are as follows, but are subject to change by the Board at any time without notice:

Horses, mules and asses.—Must be free from transmissible diseases.

Cattle.—Apparently healthy calves under six months of age and those older for immediate slaughter can be admitted without a health certificate or tuberculin test. Southern cattle for immediate slaughter and those for temporary exhibition purposes can be admitted only on a special permit. All others are to be accompanied by health certificate and a satisfactory tuberculin test.

Hogs.—Must be free from transmissible disease. Hogs for purposes other than immediate slaughter, if hauled, must be transported in cleaned and disinfected cars or other conveyances. Such swine must not be handled through public stockyards or pens.

Sheep.—Must be free from transmissible diseases.

Who may inspect.—State Veterinarian, officially certified inspectors in the State from which cattle originate, agents of the Pennsylvania State Livestock Sanitary Board and inspectors of the United States Bureau of Animal Industry.

In order to prevent the spread, within the State, of the transmissible diseases above mentioned, the Board is specifically charged with placing and enforcing special and general quarantines, the destruction of animals, the proper disposal of their carcasses, the cleaning and disinfecting of premises, to supervise the use of biological products and see that their sales and uses are properly reported and to require the pasteurization of skim milk returned from creameries, etc., that is to be used as food for calves or hogs.

Due to the fact that so much of our appropriation was used in paying foot-and-mouth disease bills it was necessary to change the policy of the Board in handling its work after July 1, 1915. The necessary changes were outlined in a letter sent out June 29, 1915. A copy of this letter follows:

TUBERCULOSIS

1. No indemnity can be paid for cattle condemned and destroyed to prevent the spread of tuberculosis.
2. No tuberculin tests can be made on native cattle at State expense.
3. The Board will furnish tuberculin, free of charge, to qualified and licensed veterinarians upon application to test native cattle at owner's expense.
4. All tuberculin tests and all cattle condemned as tuberculous upon physical examination or tuberculin test must be reported to the Board promptly.
5. Such condemned animals may be placed in quarantine by the veterinarian making the test.
6. They must be tagged and marked in such a way that they can be identified in the future.
7. They will be held in quarantine until permission shall be given by the Board for removal for slaughter or other satisfactory disposal.
8. Milk from cows condemned for tuberculosis must not be used as food for animals or man until properly pasteurized.
9. Animals condemned for tuberculosis may be killed under official inspection. If a carcass passes inspection under State or Federal Meat Hygiene regulations it may be used for food. The owner is entitled to the salvage obtained from the sale of the carcass, hide and offal.

INTERSTATE CATTLE

1. No changes are made in reference to bringing cattle from other states.
2. The Board maintains a list of certified veterinarians whose tests will be approved when shipments are to be made to other states. This list is exchanged with other states. Information will be furnished upon request showing the qualifications necessary to be admitted to the certified list.

GLANDERS

1. All cases of glanders and all mallein tests must be promptly reported to the Board.
2. Animals showing clinical symptoms of glanders and those condemned for glanders upon the recognized tests but showing no physical symptoms of this disease may be killed or must be placed in quarantine and marked or described in such a way that their identity can be established.
3. All horses and mules exposed to glanders must be quarantined and tested.
4. Local veterinarians will be provided, free of charge, supplies for testing suspected cases and animals that have been exposed to glanders.
5. The Board will not pay the local veterinarian for services.
6. An effort will be made to provide an agent of the Board to destroy all glandered horses and conduct an autopsy where necessary.
7. A positive or negative ophthalmic reaction should be considered final. Blood specimens are to be sent to the laboratory for seralogical tests only in connection with atypical reactors.

HOG CHOLERA

1. All cases of hog cholera and the use of all hog cholera serum must be reported to the Board. Serum for use in connection with active outbreaks of cholera will be furnished free of cost to approved veterinarians. The cost of injection of serum is to be borne by the owner. Report of use of serum and results obtained must be submitted on blanks that will be provided.
2. Hog cholera virus will not be permitted to be used except in special cases and then by one properly prepared and equipped to use it.

For further information in reference to hog cholera, see Circular No. 34.

ANTHRAX AND BLACKLEG

1. All cases of anthrax or blackleg, or the use of vaccine in controlling either disease, must be reported promptly to the Board.
2. Local veterinarians will be provided, free of cost, upon application, supplies and instructions for controlling outbreaks of either disease.
3. The Board will not pay the local veterinarian for services rendered in handling or controlling either of these diseases.
4. The free annual spring vaccinations cannot be continued, but the owner should continue this work. The Board will furnish vaccine and report blanks free of charge.

RABIES

1. The Board will not pay for procuring and shipping specimens to the laboratory. Precautions necessary to prevent the spread of rabies will be taken by the Board.

MISCELLANEOUS.

Other transmissible diseases of animals coming under the jurisdiction of the Board will be handled along lines indicated above.

LABORATORY

1. Specimens may be sent to the laboratory for diagnosis as in previous years.
2. Extreme care should be exercised in packing and shipping such specimens. During the hot weather many specimens decompose during shipment. In some cases this might be avoided if properly packed in ice.
3. Don't ship specimens so they will arrive at the laboratory Saturday afternoon or Sunday.
4. Ship all specimens direct to the State Livestock Sanitary Board, 39th Street and Woodland Avenue, Philadelphia, Pa. Shipping charge must be prepaid.

It will be noted that the principal change in the policy of handling transmissible diseases is the fact that veterinary services except in special cases will be paid for by the owner. The Board, however, continues to supply the necessary biological products and continues to place its laboratory at the disposal of stock owners and veterinarians for the purpose of establishing diagnoses in connection with diseases of animals.

This change of policy, at first glance, may seem to place a great burden upon stock owners; but the veterinarian's fee is often the smaller portion of expense. In an outbreak of hog cholera for instance the serum is furnished by the Board, free of expense, to the owner. In the majority of states he must purchase it from commercial firms or the State.

The transmissible diseases which the Board is especially required to control will be considered in their regular order.

GLANDERS

Glanders showed a slight increase during the year 1914. The increase was especially observed in the large cities. For this reason the Board decided to order the closing of all public troughs and fountains in Philadelphia used for watering horses during the season. The results were generally satisfactory to the Board, horse owners and the city authorities, yet some interested in humane work especially felt that the order worked unnecessary hardship upon drivers who could not or would not carry individual drinking buckets. The plan of diagnosing and handling the disease was the same as in the previous year.

Our experience with ophthalmic mallein as a diagnostic agent had proven so uniformly satisfactory that only in exceptional cases do we use subcutaneous mallein. In the control of this disease, however, we are not satisfied to depend upon any one test and all horses except those showing positive physical symptoms of the disease are submitted to the ophthalmic test and the complement-fixation and agglutination tests before they are destroyed or released from quarantine.

Serum tests are highly satisfactory with the exception of the fact that mules in most instances give an atypical complement-fixation reaction, which makes it necessary that an investigator working on these animals should have had a sufficient amount of experience to enable him to distinguish between an atypical reaction and the true complement-fixation reaction occurring in animals suffering from the disease. The Laboratory examined serum from 2512 horses and mules during the year 1915. Ten specimens of pus or diseased tissue from suspected glanders were examined during the same time. Every horse or mule condemned by any of these tests has been autopsied unless the case showed positive physical symptoms and in every case unmistakable lesions of the disease were found.

A physical case of glanders is condemned and destroyed at once and the premises cleaned and disinfected under official supervision. The exposed stock is placed under provisional quarantine and tested. If no further cases are discovered and everything indicates that the case was one of "street infection" we revoke the quarantine and close the case. If, however, several cases are found when the exposed animals are tested, these cases are disposed of as quickly as possible and the stable retested after a lapse of sixty days. If no cases are found at the time the retest is applied the case is closed. If, however, additional cases are found the stable is continued under quarantine for subsequent retests and further cleaning and disinfecting. Should the source of infection be located in another stable it is handled in the same manner as outlined above.

The following table shows the extent and general distribution of the disease for two years:

GLANDERS

Counties	No. of Cases Reported		Animals Examined Physically		Animals Tested with Mallein		Animals Retested		Condemned on Test		Condemned on Physical Ex.		Total Number Condemned.	
	1914	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914	1915
Adams,	1	0	1	0	1	0	0	0	0	0	0	0	0	0
Allegheny,	6	13	79	26	71	24	20	4	12	3	1	3	13	6
Bedford,	3	0	5	0	5	0	0	0	0	0	0	0	0	0
Berks,	4	2	6	21	3	19	0	18	0	0	0	1	0	1
Blair,	1	0	4	0	4	0	0	0	0	0	0	0	0	0
Bradford,	0	1	0	4	0	3	0	0	0	0	0	1	0	1
Bucks,	3	1	9	52	8	52	6	0	0	0	1	0	1	0
Cambria,	0	1	0	1	0	1	0	0	0	0	0	0	0	0
Carbon,	0	1	0	1	0	1	0	0	0	0	0	0	0	0
Chester,	3	3	18	21	17	21	4	0	0	5	2	1	2	6
Clearfield,	0	1	0	3	0	3	0	0	0	0	0	0	0	0
Crawford,	1	0	9	0	9	0	0	0	0	0	0	0	0	0
Dauphin,	5	0	10	0	6	0	0	0	4	0	1	0	5	0
Delaware,	3	3	14	3	14	2	4	0	5	0	1	1	6	1
Erie,	2	5	2	6	2	4	1	0	0	0	0	1	0	1
Fayette,	[illegible]	9	3	162	3	160	0	21	0	10	0	2	0	12
Franklin,	[illegible]	5	8	57	6	57	0	2	0	5	0	0	0	5
Indiana,	1	0	4	0	4	0	0	0	0	0	0	0	0	0
Lackawanna,	4	2	20	2	20	2	35	0	4	0	0	0	0	0
Lancaster,	22	32	64	82	63	80	16	0	11	0	4	1	15	1
Lawrence,	3	0	6	0	6	0	0	0	0	0	1	0	1	0
Lebanon,	1	0	3	0	3	0	0	0	1	0	0	0	1	0
Luzerne,	32	6	147	18	144	18	38	0	7	0	4	0	11	0
Lycoming,	0	1	0	1	0	1	0	0	0	0	0	0	0	0
Montgomery,	4	6	22	18	22	18	0	1	2	0	0	1	2	1
Northumberland,	0	1	0	3	0	3	0	0	0	0	0	0	0	0
Northampton,	4	0	16	0	16	0	1	0	3	0	1	0	4	0
Perry,	1	0	5	0	5	0	1	0	0	0	0	0	0	0
Philadelphia,	103	233	1,227	3,768	1,200	3,661	290	1,181	60	222	7	24	67	244
Potter,	1	1	1	1	1	1	0	0	0	1	0	0	0	1
Schuylkill,	4	1	16	2	16	2	6	0	7	1	0	0	7	1
Susquehanna,	2	1	5	8	5	8	0	7	0	1	0	3	0	4
Tioga,	0	1	0	1	0	1	0	0	0	0	0	0	0	0
Wayne,	1	0	1	0	1	0	0	0	0	0	0	0	0	0
Westmoreland,	3	12	12	22	10	20	2	0	0	1	5	2	5	3
Washington,	1	4	2	7	2	3	0	0	0	0	0	1	0	1
York,	2	2	2	12	2	12	0	28	0	2	0	2	0	4
Totals,	225	348	1,715	4,302	1,669	4,177	424	1,265	116	231	28	44	144	293

ANTHRAX

Anthrax appeared in 19 counties during the year 1914 and in four less during the following year. A greater number of vaccinations have been made than in previous years; not because of an increase in infected farms, but for the reason that owners adjoining infected premises were advised to have their stock vaccinated. In several instances, where a stream of water was judged to have been the source of infection, the stock located on both sides of the stream was vaccinated. With a single exception the eleven hundred animals vaccinated on seventy-five farms in 1915 were protected from infection. In 1915 twelve hundred and five head were vaccinated on seventy-seven farms. No deaths from anthrax followed vaccination, but fifteen head died before it was done.

It is highly gratifying to note that the annual spring vaccinations are meeting with marked success in the suppression of this disease. The same method of vaccination, namely, that perfected by Pasteur, has been employed as during previous years, and we shall undoubtedly continue its use until some more practical or efficient method has been found.

It is claimed that success has been obtained by the use of anthrax vaccine No. 2 simultaneously with the injection of an anthrax serum prepared from horses immunized against this disease. This method is being investigated and, if found practical, it may be substituted for the plan in use at present. It is said to be less dangerous and has the advantage of being administered in one instead of two doses as is necessary with the Pasteur method.

A total number of 39 specimens of suspected anthrax from different sources were forwarded to the laboratory for examination. The majority of these specimens consisted of one or both ears of the dead animals, shipped in mason jars. The examination consisted of:

1. Examination of smears of blood.
2. Examination of 24-hour cultures on agar agar.
3. Diagnostic inoculations.

Past experience has shown that the anthrax bacillus is too easily confounded with the non-pathogenic bacillus subtilis to permit of a diagnosis on microscopical examinations alone and for this reason we usually wait for twenty-four-hour cultures before rendering a report.

The following table shows the number of herds and cattle vaccinated and the results:

ANTHRAX

Counties					No. of Animals Dead			
	Herds		Vaccinated No. of Animals		Previous to Vaccination		Following Vaccination	
	1914	1915	1914	1915	1914	1915	1914	1915
Berks,	1	2	9	19	0	0	0	0
Bradford,	4	6	109	144	2	3	0	0
Bucks,	1	0	13	0	0	0	0	0
Chester,	11	11	229	226	0	0	0	0
Columbia,	1	0	13	0	2	0	0	0
Delaware,	3	3	80	71	0	0	0	0
Elk,	11	8	38	24	1	0	0	0
Erie,	1	3	7	38	0	1	0	0
Forest,	2	3	4	8	0	0	0	0
Franklin,	1	0	14	0	3	0	0	0
Lancaster,	2	1	9	13	0	0	0	0
McKean,	5	6	142	138	0	0	0	0
Montgomery,	3	4	38	40	0	0	0	0
Potter,	12	11	143	140	0	0	0	0
Susquehanna,	3	5	59	82	0	0	0	0
Tioga,	7	7	90	114	5	2	0	0
Warren,	4	6	37	93	0	9	0	0
Wayne,	1	1	41	47	1	0	1	0
Wyoming,	2	1	25	15	0	0	0	0
Totals,	75	77	1,100	1,205	14	15	1	0

BLACKLEG

The losses from blackleg subsequent to vaccination were higher in 1915 than in previous years. If the vaccine is properly given and before symptoms of the disease appear there should be no losses for the balance of the season. The immunity should last about one year. The vaccinations should be made in the spring before young cattle ranging in age from three months to three years of age are turned upon fields where the disease has occurred. Extra care is urged in diagnosing the disease and in administering vaccine in the future.

The Board will supply vaccine, and it is to be hoped that owners of infected premises will continue the vaccination of their young stock annually at their own expense, and do it before the disease gets a start.

The following table shows the counties in which infection occurred and the number of animals vaccinated and the losses:

BLACKLEG

Counties	Herds		No. of Animals Vaccinated		No. of Animals Dead			
					Previous to Vaccination		Following Vaccination	
	1914	1915	1914	1915	1914	1915	1914	1915
Allegheny,	1	1	8	7	0	0	0	0
Armstrong,	1	0	15	0	0	0	0	0
Beaver,	33	28	133	90	2	2	0	2
Bedford,	22	18	385	121	6	1	0	4
Bradford,	12	10	84	131	3	3	0	0
Butler,	1	1	3	2	0	0	0	0
Cambria,	5	8	41	105	0	1	0	0
Cameron,	1	1	14	16	0	0	0	0
Centre,	0	1	0	3	0	3	0	0
Chester,	5	6	49	64	2	2	0	0
Clarion,	4	8	46	103	0	0	0	0
Crawford,	8	9	70	66	13	6	0	0
Elk,	4	4	20	33	0	0	1	1
Erie,	76	88	1,000	979	53	17	1	5
Fayette,	5	5	62	23	2	1	0	1
Franklin,	1	0	4	0	0	0	0	0
Fulton,	3	1	24	7	0	0	0	0
Greene,	1	1	21	12	1	0	0	0
Huntingdon,	3	3	22	32	0	0	0	0
Indiana,	1	3	10	29	0	3	0	0
Lackawanna,	1	1	16	16	0	0	0	0
McKean,	3	5	27	37	2	2	0	0
Montgomery,	1	0	6	0	0	0	0	0
Perry,	1	1	5	6	0	0	0	0
Potter,	19	21	184	202	3	1	0	0
Somerset,	32	40	349	565	18	3	0	0
Sullivan,	1	1	11	12	0	0	0	0
Susquehanna,	116	103	1,351	1,[illegible]59	24	6	0	4
Tioga,	14	14	167	129	9	8	0	1
Venango,	1	1	18	13	0	0	0	0
Warren,	5	4	79	57	7	0	0	0
Wayne,	98	97	1,331	1,382	28	8	0	6
Westmoreland,	3	6	47	64	7	0	0	0
Wyoming,	0	2	0	44	0	3	0	0
York,	1	0	17	0	0	0	0	0
Totals,	483	492	5,679	5,679	180	70	2	24

CONTAGIOUS PLEURO-PNEUMONIA OF CATTLE

The last case of contagious pleuro-pneumonia in cattle known in North America was killed in New Jersey in 1892. This was the end of a long, expensive fight against the disease which was successfully conducted by the Federal Bureau of Animal Industry. It was the most successful exhibition of animal hygiene ever accomplished and stands to the present time as one of the greatest feats ever accomplished by the Bureau of Animal Industry. The disease is ever present in many parts of the old world and careful supervision will be required to prevent a re-introduction of it into this country.

We have a form of contagious pleuro-pneumonia in horses which causes extensive losses in the city sales stables. It is often fatal but is not communicable from horses to cattle. This disease can be prevented and it may be necessary in the future to do something to check its spread.

RINDERPEST

Rinderpest is a disease of cattle, sheep, goats, wild ruminants and swine. It is highly contagious and nearly always fatal. It is one of the most dreaded animal plagues known. Fortunately it has never broken out in North America. Nearly all foreign countries have had numerous outbreaks. Great Britain had the disease in 1865, 1872 and 1877. It is always present in India and causes extensive losses annually. Fortunately the virus that causes the disease is short lived and by the rigid system of quarantine maintained by the Bureau of Animal Industry on imported animals it is to be hoped that we may escape infection from this disease. Let us not underestimate the importance, however, of ever being on guard to prevent it.

HEMORRHAGIC SEPTICEMIA

Hemorrhagic septicemia in cattle has been recognized in Pennsylvania for a number of years. Formerly it was supposed to be confined principally to animals pastured on wild land or in mountain regions. During the past two years the disease has been recognized in the stockyards in cattle shipped from other states and held for a tuberculin test. Many of these cattle carried temperature so high that it prevented or interfered with making the tuberculin test. Many animals developed pneumonia and a large percentage of them succumbed to the disease. One shipper had a great deal of trouble with the disease in dairy cattle brought from other states. They were tested before delivery. Many of them would develope pneumonia and die soon after arrival at his place or after they had been delivered to the purchaser. He claimed that the tuberculin test was the cause of the trouble. It was found upon investigation that equally as many cases developed in interstate steers that were not tested with tuberculin. This form of pneumonia is caused by a micro-organism known as the bacillus bovisepticus. The disease is most prevalent during summer; is seldom seen in winter. It is somewhat similar to the form of pneumonia found in green horses. From the present appearance it is of much more economic importance than was formerly supposed.

It is known that this disease can be prevented by vaccination and the Board is prepared to furnish the vaccine for native infected herds. It is highly fatal and prompt action should be taken when it appears. It should be suspected when cattle die suddenly while at pasture when no other cause for death can be determined. In most cases it requires a laboratory examination to diagnose the disease from anthrax. It is not spread from animal to animal direct but the infection is carried by sick animals and may be protected outside of the animal body; usually from rich earth, manure, etc. Animals should be removed promptly from fields when infection has occurred. If this cannot be done for the balance of the season all susceptible animals should be promptly vaccinated.

Eleven cases of hemorrhagic septicemia were reported in our native cattle during the year and six others suspicious where the diagnosis was not established.

Where possible the vaccine treatment was used. Information from the records of the last several years indicates that an owner may lose from one to four, possibly five, animals from hemorrhagic septicemia and the losses will then cease. In the case where vaccine has been used these losses have been sustained at the time the injections were made and it is hard to determine whether the vaccine should be given credit for checking the outbreak. For the vaccination against hemorrhagic septicemia to be of practical value it should be administered to all exposed animals at the time the first case is diagnosed. To date we have not been able to accomplish this because a diagnosis is seldom established until one or more animals have died and then, by the time the case is reported, the vaccine prepared and administered, the normal number of cases will have been lost and the balance of the animals may not contract the disease if not vaccinated.

The following is a statement of the vaccinations made during the past year in two herds:

Total number of cattle,	206
Number dead prior to vaccination,	32
Number vaccinated,	174
Number sick at time of vaccination,	3
Number dead following vaccination,	5

FOOT-AND-MOUTH DISEASE

Foot-and-mouth disease is one of the most highly transmissible diseases of all ruminants and cloven-footed animals. It has been produced artifically and by contact in many other domestic and wild animals. Like smallpox, scarlet fever and a few other well known transmissible diseases of human beings, the true cause of foot-and-mouth disease has never been recognized. The best authorities consider that it is due to an organism which is so small that it cannot be seen by the highest power microscope and that it will pass through the finest filter. It usually runs a characteristic non-fatal course whether treated or not. The disease has existed in Asia for centuries, or since any record has been kept of the diseases of livestock. Within the past two hundred years it has caused most extensive losses in cattle, sheep and hogs in practically all countries where such animals are raised. Germany lost an average of $1,000,000 per year for the sixteen years from 1886 to 1902. In 1892 her losses were over $4,000,000. France sustained a loss of $7,500,000, in 1871 and England $5,000,000 in 1883. In nearly all countries of Continental Europe it is more dreaded than any other animal plague. North America has been especially fortunate so far as foot-and-mouth disease is concerned. The first case recorded in this country appeared in Montreal, in 1870, in a shipment of cattle imported from England. It spread from Montreal to Quebec, Ontario, Central and Eastern New York, New Jersey and all the New England States.

There are a few unauthenticated outbreaks recorded in various parts of the country. One for instance in Pennsylvania in 1888. This occurred in a shipment of Guernsey cattle imported by Mark Hughes and Samuel Kent, of Oxford, Pa. These cattle landed in Baltimore in 1888 and were sick upon arrival. The late Dr. Francis Bridge, of Philadelphia, who was familiar with the disease in Scotland was called to see these animals and pronounced it foot-and-mouth disease. At that time the Federal Government permitted the owner to take the animals to a place satisfactory to the Government and himself and hold them during the period of quarantine which was ninety days. These animals were divided into two lots. About forty of them were taken to Henry Palmer's place in Chester; the balance to Mr. Hughes' place at Oxford. They were treated and held in close quarantine but released and sold at the expiration of ninety days with no further trouble. Mr. Hughes claims that he was told, by the owners of the boat, that the cattle which returned in the boat in which his were brought over, developed the disease on the return voyage, and England thought the infection came from the United States. This information was obtained from Mr. Palmer. The records do not appear to be verified at Washington.

In the fall of 1902 an outbreak occurred at Chelsea, Massachusetts. This infection was carried to four states. 244 herds were infested and 4,661 animals destroyed. It took eleven months to exterminate the disease and the owners were paid in indemnity $128,908.57.

The country was then free from the disease for six years. In the early part of November, 1908, it was diagnosed in the region of Danville, Montour county, Pa. It was later found that the infection came from Michigan through the Buffalo yards, was brought into Pennsylvania by cattle shipped from Buffalo and carried to eight different districts in the State. One hundred herds were infected in this outbreak. 1,320 cattle, 977 hogs, 52 sheep, and 3 goats were destroyed. It took five months and two weeks to free the State from this infection.

Infection in the 1902 and probably the 1908 outbreaks was later traced by the Bureau of Animal Industry to smallpox vaccine that had been imported from Japan several years previous.

Another period of six years with freedom from foot-and-mouth disease followed the 1908 outbreak. Practically six years to the day from the time of the previous outbreak, the disease again occurred in Pennsylvania. This time the infection was carried to many more herds.

On October 19, 1914, Dr. John R. Mohler, Acting Chief of the Bureau of Animal Industry, called the office of the State Livestock Sanitary Board at Harrisburg and reported that foot-and-mouth disease had been discovered in Michigan and that the Federal Government had quarantined Berrien and Cass counties, Michigan, and St. Joseph and LaPorte counties in Indiana on that date. It was thought at that time that the quarantined area was sufficiently large to cover all infected territory. Within two hours from the time this information was received, a circular letter was posted from the Harrisburg office to nearly nine hundred veterinarians in the State and many of the shippers and livestock men notifying them of the outbreak and warning them to be on the lookout for any symptoms of the disease. The officers and regular agents of the Board were apprehensive of danger. Fortunately, the records of the previous outbreak were kept on file. The late Dr. Leonard Pearson had written a detailed and minute record of the events connected with the outbreak of 1908. These records were printed in the Annual Report of the Department of Agriculture for that year. After the report of the disease was received on October 19, 1914, these records were carefully reviewed and proved of inestimable value in handling the extensive outbreak which soon appeared.

The first case reported was by Dr. G. A. Wehr, of Denver, on October 29th. He reported a herd belonging to Mr. Amos Hess of Ephrata, Lancaster county, as very suspicious. This herd was one of the first to be destroyed. The first case upon which a positive diagnosis was made was in a cow in the Pittsburgh Union Stockyards on October 31st. About the same time Dr. E. W. Newcomer, of Mt. Joy, reported two suspicious herds. A positive diagnosis was made in these cases on November 1st. The positive cases found in Lancaster county had been through the Lancaster Stockyards a few days previous. An examination was made of the 1,350 head of cattle in the Lancaster yards on November 2nd. No symptoms of foot-and-mouth disease were observed at that time. The yards were quarantined, however, and no animals permitted to leave them after that date except for immediate slaughter. The animals in the Lancaster Stockyards were feeding cattle and not in prime condition for slaughter. Eighty per cent. of them had been sold for feeders in the vicinity of Lancaster. At first it appeared unreasonable to hold these animals in quarantine when there were no symptoms of disease in the lot. It was finally decided to hold them in quarantine for twelve days at the expense of the Commonwealth. If no symptoms occurred in the meantime, they might be permitted to go to the various purchasers; should the disease develop, they were to be disposed of under conditions existing at that time. Three days after the quarantine was established, several well-marked cases of the disease appeared in this lot of cattle and spread to about forty head in the next two days. A careful examination was made of each animal and those that showed symptoms of the disease were killed and buried at the yards; the balance were sent to a slaughter house and killed under Federal supervision.

On November 2, a positive case of foot-and-mouth disease was discovered in a cow belonging to Mrs. L. Schutte, of Pittsburgh. This cow had been through the Pittsburgh yards on October 12th. No other source of infection could be discovered for this animal. On the same date, Dr. I. S. Reifsnyder, of Collegeville, reported the disease in the herd of Mr. A. T. Reed, of Royersford, Montgomery county. These animals had been through the Lancaster Stockyards on October 28th. It was known at this time that about 40,000 head of cattle had been sold from the Lancaster yards during the period at which infection might have existed in the yards and an extensive spread of the disease was anticipated.

The Federal Government established a quarantine on the whole State of Pennsylvania on November 2d. On November 5, the Board established a general quarantine on Allegheny, Delaware, Lancaster, Philadelphia, York, Chester, Montgomery, Franklin, Lebanon, and Berks counties. As soon as the disease broke out in Pennsylvania, the Federal Government and the State Livestock Sanitary Board adopted practically the same plan as was in force in the previous outbreak for handling the disease, except that in the previous outbreak the Government paid two-thirds of the indemnity, while the State paid one-third. In the last outbreak it was agreed that each should pay fifty per cent. and do the work as nearly equal as possible. Branch offices were opened promptly and as nearly as possible in the centers of greatest infection. In most places sub-offices of the Federal Government and the State Livestock Sanitary Board were in the same building.

The Federal Government divided the State into three districts. G. E. Totten, at Pittsburgh, had charge of their work in the western part of the State; the central portion was in charge of N. L. Townsend, at Lancaster, while Charles A. Schaufler directed the work in southeastern Pennsylvania from his Philadelphia office.

The men in charge for the State and Federal Governments at the branch offices were as follows:

Allegheny, Beaver and Westmoreland counties and Western Pennsylvania: P. K. Jones, Union Stockyards, Pittsburgh, for S. L. S. B. G. E. Totten, Union Stockyards, Pittsburgh, for B. A. I.

Lancaster and Lebanon counties: Joseph Johnson, Woolworth Building, Lancaster, for S. L. S. B. N. L. Townsend, Woolworth Building, Lancaster, for B. A. I.

York and Adams counties: G. M. Graybill, Spring Grove, for S. L. S. B. F. W. Ainsworth, Spring Grove, for B. A. I.

Delaware and Chester counties: D. E. Hickman, West Chester, for S. L. S. B. C. C. Cole, West Chester, for B. A. I.

Montgomery and Bucks counties: H. W. Turner, Norristown, for S. L. S. B. W. L. Hiatt, Norristown, for B. A. I.

Berks and Schuylkill counties: O. G. Noack, Reading, for S. L. S. B. H. W. Hawley, Reading, for B. A. I.

Franklin county: A. O. Cawley, Greencastle, for S. L. S. B.

Montour, Columbia, and Lycoming counties: H. R. Church, Williamsport, for S. L. S. B.

Lehigh, Northampton and Carbon counties: Fred Stehle, Jr., Allentown, for S. L. S. B. A. C. Stever, Allentown, for B. A. I.

Philadelphia county: Carl W. Gay, Philadelphia, for S. L. S. B. E. C. Dingley, Philadelphia, for B. A. I.

Cumberland, Dauphin and all other counties: Harrisburg office.

The practical work in tracing diseased herds, issuing permits, destroying and burying cattle, appraising, etc., was done by men well trained in handling foot-and-mouth disease. Nearly all had had practical experience in the 1908 outbreak and were familiar with all details of the work. The Federal Government and the State Livestock Sanitary Board had about sixty professional assistants each, aside from day laborers, the stenographical and clerical help necessary to take care of the work. The Harrisburg office and various branch offices were open from seven o'clock in the morning until midnight week days and Sundays for about three months. It kept one person in each office busy nearly all the time answering the telephone. At one time during the height of the outbreak, the Harrisburg office was in telephone communication with Chicago, East St. Louis, and Louisville, Kentucky, within two hours.

Most pleasant relations existed between the Federal and State forces throughout the work of extermination and each had access to the others' records and the work was divided in such a way that very few conflicts were encountered. No particular work was assigned to either, but each did whatever was necessary to attain most speedy results. The first important work was to locate the various sources of infection. This was done by and with the co-operation of the railroads, shippers and stockyards companies. Each furnished all the assistance possible.

Many private practitioners in Pennsylvania were familiar with the symptoms of foot-and-mouth disease and all were frequently supplied with information regarding the progress of the infection. These men rendered valuable service during the outbreak by reporting cases, placing quarantines, etc. A large proportion of the new cases reported were by the local veterinarian or the owner himself.

There were three forms of quarantine in operation. The first was placed on the State or certain portions of it by the Federal Government. This quarantine regulated the shipment of livestock, hay, straw, similar fodder, hides, hoofs, hair, manure, etc., or anything that might carry infection to another State. It interfered very little with the citizens of Pennsylvania for the reason that practically all states in the Union had restrictions placed against livestock or such merchandise from Pennsylvania and all other infected states.

The State maintained two forms of quarantine—one general, the other special. These are both provided for in our law. General quarantine covered various districts in the State and this form of quarantine could be placed only by the State Livestock Sanitary Board. Special quarantines were placed on animals or premises and could be placed by any agent or member of the Board.

All agents of the Bureau of Animal Industry working in the State were appointed regular State agents as provided for by law. They then had the same authority as our regular agents. Whenever an animal or herd was found suspicious, a special quarantine was placed at once, and instructions left with the owner or man in charge as to what should be done. As soon as a positive diagnosis was made the animals were appraised and arrangements made for their slaughter. Before any herds were destroyed, the diagnosis was agreed to by the Federal and State men and in no case was complaint heard later that a mistake had been made in diagnosis.

The following is a copy of the first Order of General Quarantine adopted November 5, 1914:

"Whereas: Aphthous fever or foot and mouth disease has occurred among cattle and swine in the counties of Allegheny, Delaware, Lancaster, Philadelphia, York, Chester and Montgomery; and it is deemed that cattle and swine in the counties of Franklin, Lebanon and Bucks have been exposed, and

"Whereas: Foot and mouth disease is a dangerous and highly transmissible disease affecting cattle, sheep, goats and swine, and it is of very great importance to the livestock interests of the State and Nation that this outbreak shall be controlled and eradicated, and

"Whereas: The State Livestock Sanitary Board is charged with the control of transmissible diseases among domestic animals in Pennsylvania and is authorized and empowered by the Act of July 22d, 1913, to establish, maintain, enforce and regulate such quarantine and other measures relating to the movement of animals and their products as may be necessary for carrying out the purposes of the said act, therefore,

"It is hereby ordered, First: To prevent the spread of foot and mouth disease, and to aid in its eradication, no cattle, sheep, goats, or swine shall be moved from or out of any one of the counties of Allegheny, Delaware, Lancaster, Philadelphia, York, Chester, Montgomery, Franklin, Lebanon, and Bucks.

"Second: No cattle, sheep, goats or swine shall be moved into any one of the counties of Allegheny, Delaware, Lancaster, Philadelphia, York, Chester, Montgomery, Franklin, Lebanon and Bucks, except for immediate slaughter.

"Third: It is forbidden to drive, transport or move cattle, sheep, goats or swine over or upon public roads, highways, or railways in the counties aforesaid except upon specific permission in writing from an agent of the State Livestock Sanitary Board expressly authorized to issue such permits.

"Permits for driving, transporting or moving cattle, sheep, goats, or swine over the public roads, highways or railways must be taken out in advance and must be held by the person in charge of and accompanying such animals, and must be kept available for inspection.

"Fourth: It is ordered that no cattle, sheep, goats or swine shall be shipped by rail in Pennsylvania except in newly cleaned and disinfected cars.

"So far as possible, cars shall be cleaned and disinfected at established and specially equipped cleaning and disinfecting stations, then sealed and sent to the place where the cattle, sheep, goats, or swine are to be loaded. Stock cars not newly cleaned and disinfected must not be permitted to enter Pennsylvania.

"Fifth: The transportation of hides, skins and hoofs of cattle (including calves), sheep, and other ruminants, and of hay, straw or similar fodder, from the aforesaid quarantined area, is prohibited unless the said hides, skins, and hoofs and all hay, straw, or similar fodder be disinfected prior to movement under the supervision of an agent of the State Livestock Sanitary Board.

"Sixth: Cattle for purposes other than immediate slaughter (except apparently healthy calves under six months of age and steers) originating in other States and not under quarantine are subject to regulations of December 12th, 1913, which require that such cattle be accompanied by a certificate of health and tuberculin test chart or by a permit signed by the State Veterinarian of Pennsylvania.

"All transportation companies, cattle dealers, farmers, officers of the law and others are called upon to assist the State Livestock Sanitary Board in the enforcement of the foregoing order of quarantine so that this outbreak of disease may be eradicated with the least possible loss and in the shortest possible time."

The Second Order of General Quarantine became effective November 10th. This placed the whole State in quarantine and certain restrictions on admitting livestock into Pennsylvania, and on moving livestock, hides, hay, manure, etc., interstate.

The following instructions were given for the guidance of agents in issuing permits:

"Permits may be issued for the removal of cattle, sheep, other ruminants or swine.

"First: When necessary to procure water or move from summer to winter quarters, provided an official examination has been made within two days of each of the aforesaid animals to be moved and all are found to be free from evidence of foot-and-mouth disease. Such examination may be made by an agent of the Board or by a reliable licensed veterinarian.

"Second: When cattle, sheep, other ruminants or swine are to be moved for immediate slaughter, and an examination has been made within two days of each of the affected animals to be moved and all are found to be free from evidence of such disease. Such examination may be made by an agent of the Board or by a reliable licensed veterinarian. In issuing permits for the removal of animals under the provision of this and preceding sections due consideration must be given to the prevalence of foot-and-mouth disease in the neighborhood in which the animals are to be moved.

"Permits may be issued for the removal of hay, straw or similar fodder.

"First: When harvested or stored upon premises upon which there have been no cattle, sheep, other ruminants or swine since September 1, 1914.

"Second: When harvested or stored upon premises where no cattle, sheep, other ruminants or swine have been introduced since September 1, 1914, and an affidavit is presented stating that all of said animals are free from evidence of foot-and-mouth disease.

"Third: When harvested or stored on premises that contain cattle, sheep, other ruminants or swine that have been acquired since September 1, 1914, and a reliable, licensed veterinarian's certificate is presented certifying that each of said animals has been carefully examined within forty-eight hours and that no evidence of foot-and-mouth disease was found. Said certificate shall state the number and kind of animals acquired since September 1, 1914, also where and how acquired.

"Fourth: No permits shall be required for the movement of hay, straw or similar fodder from one non-infected premises to other premises in the same city, borough or town.

"Permits may be issued for transporting hides or skins.

"First: When disinfected under official supervision.

"Second: When collected at a central point between the dates of September 1, 1914, and November 14, 1914, for transportation in sealed cars or placed in water tight containers and hauled to a point within the State for disinfecting under official supervision, provided cars containing such hides or skins are again sealed until cleaned and disinfected under official supervision or if otherwise transported that the containers and vehicles are cleaned and disinfected under official supervision before again being used for any purpose.

"Third: Any person desiring to collect hides or skins must file an affidavit which shall contain the statement that all hides or skins will be thoroughly dipped in a one to one thousand solution of bichloride of mercury at place of purchase, then placed in water tight containers to be transported to a central point where arrangements have been made for the disinfection of the hides or skins under official supervision.

"Special arrangements may be made for official supervision for disinfecting more than ten hides or skins stored at one point."

No fee was charged for any permit issued by an agent of the Board. However, in some instances where it was not possible for the Board to furnish an agent to make the inspection as soon as the owner wanted it, permits were issued on the strength of a certificate from the local veterinarian. These certificates were procured by the owner at his own expense.

The third Order of General Quarantine became effective December 1st. This released twenty-five counties in the State that were believed at the time, and found later to be, free from infection and to which no animals had been traced from public stockyards.

The fourth Order of General Quarantine became effective December 9, and released fifteen more counties in which no infection had been found. Twenty-seven counties were still in quarantine.

On January 4, a few changes were made in reference to issuing permits. The new regulations follow:

"Permits may be issued for the removal of cattle, sheep or swine into or within the quarantined area.

"First: When the animals to be moved are for immediate slaughter and the owner makes written statement that all cattle, sheep and swine on the premises are free from foot-and-mouth disease and obligates himself to see that immediate slaughter takes place.

"Second: When the animals to be moved are for purposes other than immediate slaughter and a certificate from a reliable and competent veterinarian is presented showing that all cattle, sheep and swine on the premises have been examined within twenty-four hours and are free from foot-and-mouth disease. The expense of such examination must be borne by the owner of the stock.

"Permits may be issued for the removal of cattle, sheep or swine from a point within to a point outside of the quarantined area in Pennsylvania.

"First: When the animals to be moved are for immediate slaughter and the owner files an affidavit that no cattle, sheep or swine have been received since October 1st, 1914, and that all such animals on the premises are free from foot-and-mouth disease and obligates himself to see that immediate slaughter takes place.

"Second: When the animals to be moved are for purposes other than immediate slaughter an examination of all cattle, sheep and swine on the premises has been made within twenty-four hours by an agent of the Board, and all are found free from foot-and-mouth disease.

"Public sales of cattle, sheep or swine may be held within the quarantined area upon permit from the State Veterinarian. To procure such a permit the owner of the livestock must make written application to the Harrisburg office at least one week in advance of the date of the sale. The application must state the name and post office address of the owner, the location of the premises, name of township in which located, the number and kind of animals on the premises, and state the distance the nearest infected farm is located, giving the name of the owner of the infected farm. In case any cattle, sheep or swine have ben received since October 1, 1914, the application must indicate from whom and where purchased.

"In case permission is given for holding sale, all cattle, sheep and swine on the premises must be carefully examined by an agent of the Board or by a reliable and competent veterinarian within thirty-six hours prior to time of starting sale, and if no evidence of foot-and-mouth disease is observed the sale may proceed.

"A representative of the Board must be present during the sale to issue permits authorizing the removal of the cattle, sheep or swine to the premises of the purchasers.

"Permits may be issued for the removal of hay, straw or fodder into or within the quarantined area.

"First: When the owner presents a written statement that no cattle, sheep or swine have been received on the premises since October 1, 1914, and that all animals on the premises are free from foot-and-mouth disease.

"Second: When cattle, sheep or swine have been received since October 1, 1914, the owner will file affidavit stating number and kind of animals received since October 1st, where procured, and further that Aphthous fever does not exist on the premises.

"Permits may be issued for the removal of hay, straw, or fodder, from a point inside of the quarantined area to a point outside of said area.

"First: When a certificate is presented from a reliable and competent veterinarian certifying that all cattle, sheep and swine on the premises have been examined within forty-eight hours and found to be free from foot-and-mouth disease.

"Second: In instances where the hay, straw or fodder is stored upon premises where there have been no cattle, sheep or swine since October 1st, 1914, and an affidavit to that effect is filed.

"Permits may be issued for the removal of hides from within to a point outside of the quarantined area when the hides are dipped under official supervision. For other restrictions in reference to handling hides see Section 7 of the Order of General Quarantine adopted December 30th, Form 165.

"In issuing permits for the removal of animals, hay, straw, fodder and hides, due consideration should be given to the extent of infection in the neighborhood. The advisability of issuing a given permit is left to the judgment of the respective agents in charge."

The fifth Order of General Quarantine became effective January 4, 1915. This released portions of all quarantined counties excepting Berks, Lancaster, Lebanon, Lehigh and York.

The sixth Order of General Quarantine became effective February 1, 1915. Lancaster, Lebanon, Lehigh, and York counties were still held in quarantine. In this form the Board adopted the same plan of dividing quarantined territory as was used by the Federal Government. This change was found to be a desirable one and can be recommended for effectual work in the future. This form of quarantine provided for "closed," "exposed," "modified," "restricted" and "free" territory.

Closed area was all territory within a radius of three miles of an infected premise that had been disinfected for less than fifteen days.

Exposed area was all territory in a township or municipality beyond the limits of a closed area, also all townships or municipalities containing an infected premise that has been disinfected for more than fifteen days but less than thirty days.

Modified area was all quarantined territory not included in a closed or exposed area.

Restricted area was one from which the interstate movement of livestock was permitted to free and closed areas for immediate slaughter, and for any purpose into exposed and modified areas.

Free areas were those sections which were not under quarantine for foot-and-mouth disease.

At this time Pennsylvania had twenty-one counties which contained territory classed under one of these five forms of quarantine. The State and Federal classification of quarantined territory was not the same at all times. The State considered it safe at certain times to take chances in moving livestock and produce interstate, when the Federal Government would not have been justified in permitting such movements interstate.

The seventh Order of General Quarantine became effective Februrary 25th. This quarantine had reference especially to bringing livestock in from other states. The disease was practically eradicated on January 15, 1915. Between that date and February 1, thirty-seven infected shipments were received from points outside of the State. Those engaged in the slaughter business were permitted to receive stock for immediate slaughter from Federal free, restricted and modified territory from other states. Such shipments were permitted only for immediate slaughter and by immediate slaughter was meant within forty-eight hours. In a number of places the persons permitted to bring stock in under these conditions failed to comply with the requirements, and in some cases did not slaughter such stock for a week or more. Within a period of two weeks new infections had been discovered in several parts of the State that could be traced directly to animals brought in for immediate slaughter.

At the same time railroads were hauling stock from portions of the West that were under Federal quarantine through Pennsylvania to the eastern markets. There was evidence to show that infection had been spread from railroads handling such shipments. For this reason a quarantine was established by the Board on February 25, which prevented the shipment into or through Pennsylvania of livestock for any purpose that originated in Federal closed, exposed or modified territory or was handled through yards so classified by the Federal Government. At this time the Chicago stockyards were included. By referring to the map it will be observed that Pennsylvania occupies a unique position in reference to shipments from the western markets to the eastern seaboard. Canada at this time would not permit shipments to go through any portion of the Dominion and no shipments could get to New York, New Jersey or the New England markets without passing through some portion of Pennsylvania. For this reason such shipments were blocked.

The eighth Order of General Quarantine became effective March 16th. It was possible under this order to again make shipments from Chicago Union Stockyards into and through Pennsylvania for the reason that they had disinfected and set aside a portion of the yards for handling livestock that originated in Federal free territory. All of Lancaster county and portions of nineteen other counties were still in quarantine.

The ninth Order of General Quarantine became effective April 1, 1915, and was adopted for the purpose of taking care of wild animals belonging to shows, breeding cattle and animals belonging to tenant farmers. It classed with the domestic ruminants and clover-footed animals, deer, peccary, buffalo, bison, camel, llama, giraffe, and antelope. Circus animals were permitted from Federal free territory but no such exhibitions were allowed in any section of the State under quarantine.

Anticipating the trouble and inconvenience to breeders and tenant farmers during the month of April, in not being able to move animals from other states into Pennsylvania, provisions were made in this quarantine for handling cases of this kind. It was made possible to bring pure bred animals into Pennsylvania for breeding purposes if brought in crates by express from Federal free or Federal restricted territory in other states, provided such shipments did not pass through public stockyards. Bona-fide tenant farmers who were obliged to move from Federal free or Federal restricted area in an adjoining state were permitted to move into restricted areas in Pennsylvania, provided the laws and regulations for the control of tuberculosis and hog cholera were complied with and the movement had the sanction of the Federal Bureau of Animal Industry. Such transfers were made only when the owner filed a certificate from a qualified veterinarian that his stock had been examined within forty-eight hours and found free from infection.

The tenth Order of General Quarantine became effective May 1, 1915. It still held in quarantine portions of Allegheny, Butler, Chester, Erie, Jefferson, Lebanon, Philadelphia, Schuylkill, Warren and Westmorland counties.

During the latter part of April the disease broke out in portions of Philadelphia. In this territory about 30,000 hogs are kept and fed principally on garbage. In one herd a few hogs were observed that showed suspicious symptoms of foot-and-mouth disease. There were about three hundred hogs, one cow and two calves on this premise. The cow and two calves showed no symptoms of the disease. A good sized vesicle on the nose of one of the hogs was ruptured and the contents rubbed into the mouths of the three bovine animals. They never developed the disease and according to the owner's statement had not been sick or showed any suspicious symptoms, yet he reported that his hogs had been showing somewhat similar symptoms for the past month. From the fact that the cattle showed no lesions of the disease and developed no symptoms from the test applied to them, there was some doubt whether the disease might be due to other causes. About the same time a similar condition of affairs was observed in two adjoining herds of hogs. In order to make sure of the diagnosis, it was decided to place test animals on one of these places. A cow and a yearling bull from the State Farm, where the disease had not existed, were taken to these premises. Material was obtained from an unbroken vesicle on the nose of one of the pigs and injected intravenously into each of the bovine animals. In about forty-eight hours both animals showed well marked lesions of foot-and-mouth disease. Their temperatures were high, they were slobbering, smacking the lips, vesicles in the mouth and well marked foot lesions. All diseased animals in this section were then promptly destroyed and those in the infected herds which showed no symptoms of disease were sent to a slaughter house. 3,153 hogs were killed on account of this outbreak. A careful observation was kept over the balance of the hogs in this territory and no more trouble developed. It is remarkable under the conditions that more of these hogs did not develope foot-and-mouth disease.

The source of infection in this outbreak was not positively traced. It might have come from garbages but is more likely to have been brought there by hog dealers and the owners themselves as some of them were known to have been at the various slaughter houses during the time animals from quarantined areas were being slaughtered. A general quarantine was placed on all territory south of Washington Avenue and between the Delaware and Schuylkill rivers.

The eleventh Order of General Quarantine became effective June 1, 1915. This placed an embargo against all shipments from the State of Kentucky. It was done for the reason that the disease was found in two shipments of hogs that arrived in Philadelphia from Kentucky the latter part of May. It released all territory in the State except portions of Allegheny, Erie, Philadelphia, Schuylkill and Warren counties.

At this time the officers of the County Fairs desired information in reference to holding their fall exhibition. The following instructions were sent to the Secretary of each County Organization:

"The State Livestock Sanitary Board has decided to allow the exhibition of cloven footed animals at Agricultural Fairs in territory that is not under State Quarantine for foot and mouth disease. No cloven footed animals will be permitted to leave the counties or territory in Pennsylvania for exhibition purposes that is under State Quarantine. Cloven footed animals may be brought into Pennsylvania for exhibition purposes only upon official permit from the State Livestock Sanitary Board.

"Application for such permits must be made at least two weeks in advance. No permits will be issued for stock which originates or has been exhibited in any except Federal free territory."

The twelfth Order of General Quarantine became effective June 7, 1915. It released all territory except small portions of Allegheny, Erie, Philadelphia, Schuylkill and Warren counties. This was the last Order of General Quarantine adopted on account of this outbreak of foot-and-mouth disease, and was revoked by Circular No. 35, which became effective July 28, and released from State Quarantine all territory in the State and removed the restrictions that had been placed against the movement of livestock, etc., within the State except from premises under special quarantine.

The first case of foot-and-mouth disease was found in Pennsylvania on October 29, 1914. The last case of the disease found on a farm in Pennsylvania was April 25, 1915, a lapse of 178 days or 5 months and 27 days from the date the first case was discovered to the date of discovery of last case. The first general quarantine established by the Board was on November 5, 1914. The last general quarantine was revoked July 28, 1915, making a period of 265 days, or 8 months and 23 days during which time there was a general quarantine on some portion of the State.

On the day this quarantine was revoked, the disease was discovered in Steuben county, New York. No infection had previously been found in that county. This infection was carried to a creamery within three miles of the Pennsylvania line and to which some Pennsylvania farmers were selling milk and returning skimmed milk for food for calves and swine. No infection was picked up in this way due to the foresight and good management of the man in charge of the creamery as he had taken the precaution to pasteurize the milk and sterilize the cans. The annual meeting of the United States Livestock Sanitary Association, held at Chicago in December, 1915, passed a resolution commending him for his good work.

On August 8, 1915, a second outbreak occurred in the State of Illinois from hog cholera serum that had been made in October of the previous year. Infection from this outbreak was carried to six counties in the State of Illinois and one county in each of the States of Indiana, Michigan and Minnesota. This outbreak made it necessary for Pennsylvania to adopt new regulations for handling livestock from Chicago and the northern part of Illinois.

Amendment 1 to Circular No. 35 became effective September 16, 1915, and excluded shipments of livestock from all portions of the State of Illinois that was under Federal quarantine.

Up to the end of the year 1915, certain restrictions were placed on shipments from northern Illinois. It was decided to retain the embargo placed against shipments from Federal closed, exposed and modified territory in other states, which was adopted November 10, 1914. It was decided to allow no such shipments to enter the State for any purpose except from Federal free territory. It is believed that, if the precaution had not been taken, another infection would have occurred in the State which migh have been as embarrassing as the one in the previous year.

The second form of quarantine, known as a special quarantine, which is provided for in the Pennsylvania law, was still continued on certain premises where test animals had not been placed and restocking completed. This form of quarantine follows:

To ....

.................................P. O.,

....Co., Pa.

You are hereby notified that in accordance with the provisions of the Act of July 22, 1913, and the regulations of the State Livestock Sanitary Board, you are required to isolate and place in quarantine on your premises, the following described animal ....

....

....

under suspicion of being affected with or having been exposed to the disease known as aphthous fever or foot and mouth disease, a dangerous contagious disease.

You are hereby forbidden to remove from said premises any of the above described animals, or any animal, material, article or thing that is likely to or may convey contagion.

This quarantine remains in force until it is revoked by authority of the State Livestock Sanitary Board.

You will be governed by the following regulations of the State Livestock Sanitary Board:

1. Cattle, sheep, goats, and swine under quarantine on account of foot and mouth disease must be kept absolutely and wholly separate and apart from all other animals and all other animals must be kept wholly apart from quarantined animals.

2. The quarantine is extended to animals other than those originally quarantined, if they are permitted to come in contact with quarantined animals or to enter quarantined premises.

3. Persons caring for animals quarantined on account of foot and mouth disease must not, under any circumstances, come in contact, either direct or indirect, with other cattle, sheep, goats or swine.

4. No animals shall be allowed to run loose or free on or near quarantined premises. This regulation covers domesticated animals of all kinds, including dogs, cats and poultry.

5. If there are pigeons on a farm or on premises quarantined on account of foot and mouth disease the pigeons shall be killed or they shall be confined on the said quarantined premises until released by authority of an agent of the State Livestock Sanitary Board.

6. If domesticated animals, dogs, cats, poultry or pigeons are kept at liberty or allowed to go free so near quarantined animals or premises that they constitute, in the estimation of an agent of the State Livestock Sanitary Board, a menace to the efficiency of the quarantine, such animals may be confined and placed under quarantine.

7. Milk from diseased or exposed cows or milk produced in or on quarantined premises shall be placed in milk cans, or other receptacles that have covers that fit tightly. Formaldehyde shall be added to such milk in the proportion of one pint of formaldehyde to thirty quarts of milk. The cover shall then beplaced on the can or receptacle and the milk and the formaldehyde shall be allowed to remain in the cow stable, undisturbed, for not less than eight hours, after which it is to be poured into a pit dug in the manure pile and covered over with manure. The agent of the State Livestock Sanitary Board may authorize other safe methods for disposing of such milk.

8. There shall not be removed from quarantined premises, without specific permission in writing, from an authorized representative of the State Livestock Sanitary Board, any material, article or thing that is likely to or that may convey contagion, and, in particular, there shall not be removed from such premises any milk or milk products; diseased or quarantined animals; hay, straw, fodder, grain or other feed; manure, stable or milk utensils.

9. Horses that are to be used must be kept in a stable separate from the buildings and premises under quarantine. Before removal to such stable, the horses shall be thoroughly cleaned, their feet and legs shall be disinfected and the halters and harness shall be disinfected, under the supervision of an agent of the Sate Livestock Sanitary Board.

10. Persons caring for quarantined animals must not convey or permit the conveyance, from the quarantined premises, of articles, materials or things that have been in contact with or are contaminated by or that may have been contaminated by diseased animals

11. All unauthorized persons are forbidden to enter quarantined premises or to come in contact with diseased or exposed animals, or with any object or thing that may have been contaminated by, or from, such animals.

Your attention is directed to the following part of Section 15 and Sections 17 and 39 of the Act of July 22, 1913;

Section 15. * * * *

A special quarantine may be established and maintained whenever any domestic animal or poultry shall be affected with or exposed to any of the diseases enumerated in section nine of this act or any other disease of domestic animals or poultry now or hereafter adjudged and proclaimed by the State Livestock Sanitary Board to be of a transmissible character, or there shall be any animal or poultry which it is deemed necessary by the State Veterinarian or any other officer or agent of the State Livestock Sanitary Board to have examined or tested. The State Veterinarian or any officer or agent of the State Livestock Sanitary Board shall have the power to establish and maintain any special quarantine. It shall be the duty of the State Veterinarian or any officer or agent of the State Livestock Sanitary Board establishing a special quarantine to post on the building, structure, pen, coop, car, vessel, vehicle, field or enclosure wherein the animal or animals or poultry quarantined are confined or contained a notice declaring the quarantine, a description of the animal or animals or poultry quarantined and of the premises where quarantined and of the duration of such quarantine. Such quarantine may continue for such time as the State Veterinarian or the officer or agent of the State Livestock Sanitary Board establishing the same may deem advisable to accomplish the purpose of quarantine. * * * *

Section 17. It shall be unlawful for any person to tear down or deface or to destroy any notice of quarantine posted by any member, officer, agent, or employee of the State Livestock Sanitary Board, or to remove or destroy, wholly or partially, any portion of a building or tree or fence whereon the same shall have been posted.

Section 39. Any person, firm or corporation that shall violate any of the provisions of this act shall be guilty of a misdemeanor and upon conviction thereof shall for the first offense be sentenced to pay a fine of not more than one hundred dollars. For each subsequent offense such person, firm or corporation shall be sentenced to pay a fine of not more than five hundred dollars, and in addition thereto such person or each of the members of the firm, or each of the directors of the corporation, as the case may be, with guilty knowledge of the fact may be sentenced to undergo imprisonment in the jail of the proper county for a period of not less than ten nor more than ninety days or either or both at the discretion of the court.

C. J. MARSHALL,
State Veterinarian.

Read and posted

........................191......

By ....
Agent of the State Livestock Sanitary Board.

The plan for revoking special quarantine was contained in a form letter, which was sent to the owner of each herd that was slaughtered. The letter follows:

"February 24, 1915.

"Dear Sir: We take this means of advising you that the premises occupied by your diseased animals are still under quarantine on account of foot-and-mouth disease and will remain so until the individual quarantine order is officially revoked, even though our general quarantine may be removed from the area in which your place is located.

"No cattle (including calves), sheep or swine are to be placed on a quarantined premise without specific permission from an agent of the Board authorized to supervise the restocking of infected premises. This permission is not given until sixty days have elapsed from the time the premises were cleaned and disinfected. Not more than two animals, and preferably one, are permitted on the premises for three weeks. These animals are under quarantine and are examined by agents of this Board every three days. If at the expiration of three weeks no evidence of foot-and-mouth disease is observed, a few additional animals may be added from time to time under our supervision. The matter of fully restocking cannot be taken up until ninety days from the date the disinfecting was finished, and then only in case we are satisfied that all danger of reinfection has passed. Before permission is granted for restocking your premises, it is most important that manure, litter, etc., in and about the barn and barnyard be removed and spread on an isolated field where it will be plowed under this spring. The barnyard should then be scraped, heavily limed and allowed to stand.

"When you are ready to restock we would suggest that you communicate with our nearest branch office, or with this office direct."

Our records show that infection occurred on 788 farms, while the report of the Bureau of Animal Industry shows that 904 herds were destroyed. The difference is probably due to the fact that the State did not include the animals destroyed in slaughter houses among the number of herds reported on farms. Another discrepancy perhaps is due to the fact that some herd owners had diseased animals on two or more farms. Our Board counted these as one infected herd while the Bureau reported each as a separate herd. No statistics have been complied which would show the vast number of animals examined in this way.

The largest number of infected herds was found in Lancaster county in which 192 herds were destroyed. Berks county stood next to Lancaster with 125 herds destroyed. The disease extended from Philadelphia to Erie. Very little of the State escaped the original infection. It was necessary in all cases to examine not only the stock in the infected herd but all herds within three miles of every infected herd. In most cases these herds were examined five times or more before the territory was released from quarantine. No record was kept of the vast number of herds examined in this way. The Federal Government and the State had over one hundred men engaged in this work, and in no instance was there a suspcion that the disease had been spread by any of these agents. This speaks well for the careful work done and the thoroughness with which the disinfection of the clothing was carried out, and should give herd owners more confidence in the future that the disease will not be spread by men who understand the precautionary measures that are necessary.

Pennsylvania experienced considerable difficulty in controlling the spread of the disease from creameries. Since 1913 we have had a law which made it compulsory for creameries to pasteurize all skimmed milk returned as feed for calves and swine. If this precaution had been more generally observed much loss from foot-and-mouth disease would have been prevented. It was necessary in a few cases to close creameries entirely to stop the spread of infection. The disease was spread to a certain extent by owners themselves and by people going from farm to farm for various reasons as visitors, exchange of labor, livestock buyers, men buying hides and those dealing in dead animals and various kinds of farm produce. In the beginning of the outbreak the disease was carried to a few herds by the local veterinarians who were not on their guard, had not equipped themselves with a rubber outfit which could be properly disinfected before and after examining cattle, and in their daily practice. However, as soon as they realized that we were dealing with a serious outbreak of foot-and-mouth disease, they observed all necessary precautions.

On account of the publicity given the disease by the agricultural and daily papers as well as by circulars from the departments, stock owners and all other parties interested in livestock soon became familiar with the disease and how to prevent its spread. This had a very beneficial influence on controlling it. In the beginning of the outbreak some difficulty was experienced in destroying herds and disinfecting premises promptly, for the reason that so many herds were affected with the disease at the same time and it was not possible for the agents to attend to them in all cases as soon as should have been done. During the fall of this year, there was an extensive drought in Pennsylvania. This interfered greatly in digging trenches for the burial of slaughtered animals. In some cases it was necessary to use dynamite, Much of the disinfecting was done during the coldest weather of the winter, when the manure and earth in the barnyard was frozen to a considerable depth. Considering the condition of the weather under which the disinfection was done, the results were unusually good. Of the 904 premises disinfected, but five showed infection when test animals were placed upon them.

Pennsylvania was extremely fortunate in many ways in being so well prepared for handling an extensive outbreak of this nature. The 1913 legislature provided a law for handling the transmissible diseases of animals, that was believed at the time it was adopted to be ideal and since has proved efficient in all cases. This was a codification of the laws under which the Board had operated for a number of years, and in every case gave abundant authority for handling this outbreak safely and promptly. Without this authority, our work would have been badly handicapped. In most cases owners submitted willingly to the requirements of the Federal and State laws. No injunctions were taken out to interfere with the progress of the work, and in only three places was it necessary to call upon the State police to enforce quarantines or destroy livestock in accordance with the requirements.

Special credit should be given to Ex-Governor John K. Tener, Governor Martin G. Brumbaugh and Attorney General Francis Shunk Brown, who gave all the support and assistance possible to eradicate the disease and protect the citizens of the Commonwealth from further infection. Had it not been for the strong stand taken by Governor Brumbaugh and Attorney General Brown in reference to hauling livestock across the State, there is no doubt but much more difficulty would have been experienced in checking the spread of the disease.

The co-operation from all sources was commendable; but special credit should be given to the railroads, stockyards companies and shippers. Stockyards companies disinfected their premises several times and at their own expense. One company in particular paid over $47,000 for work of this kind. The different railroads disinfected each of the small shipping stations to which infected stock had been received at their own expense. The various railroads cooperated fully in following the regulations of the Federal and State Governments. All of their agents were supplied by them with the regulations and they were instructed to comply with the requirements fully and much assistance was given the work by such agents.

It is impossible to mention individually each practicing veterinarian and regular agent of the Board who deserve recognition for their loyalty and untiring efforts in the work of eradicating this disease. Many veterinarians left their more lucrative and pleasant practice to go to another section of the State to assist in the work. These men, as well as our regular agents, worked long hours, in many instances on holidays and Sundays, under the most trying weather conditions. Their work is appreciated by the Board and, we trust, by the livestock interests of the State.

The Board is especially grateful to the members of the Legislature for the generous manner in which they appropriated money to pay for the herds and property destroyed.

At the time the outbreak occurred there was about $77,000 in the treasury of the Board. This was soon exhausted. The State's share of the appraisements promised the owners of livestock amounted to nearly $360,000. As soon as the outbreak occurred, the Board dropped all other work. The agents and assistants devoted their whole attention to this work from the time the disease was discovered until it was exterminated and the quarantine removed.

The Legislature met in January, 1915. A request for $500,000 was made by a special order of business as soon as the legislature was organized. This amount was promptly granted without a dissenting vote or a word against it from either House. Later it was necessary to ask for $125,000 which was as willingly granted.

The total amount of money used by the Board for paying indemnity on cattle and property destroyed, disinfectants, pumps, supplies, unskilled labor, traveling expenses, services, clerical and miscellaneous items necessary to exterminate this disease, was $668,441.66. 128 barrels of Cresol, 75 kegs of Formaldehyde, 2,000 pounds of Potassium Permanganate and 5,500 pounds of Bichloride of Mercury were used during the outbreak.

This represents but a small part of the losses that this disease caused the people of Pennsylvania. It is not possible to estimate in dollars and cents the amount of loss to those engaged in raising or handling livestock, farm produce, etc., through the loss of business caused by restrictions, embargoes, etc.

A bill was introduced which raised the limit to full value on all kinds of livestock that it might be necessary in the future to destroy on account of foot-and-mouth disease. This bill passed both houses of the Legislature without a dissenting vote and was promptly signed by the Governor.

In the 1908 outbreak it was possible for the Board to pay its full share of indemnity in all cases for the reason that the State paid but one-third of the indemnity while the Federal Bureau paid two-thirds. One-third of the value of animals destroyed at that time did not exceed the limit of $40.00 which was permissible under the State law for non-registered stock and $70.00 for registered animals. In the last outbreak when the State paid one-half of the indemnity these limits were sometimes exceeded. The records show that about $11,000 more would have been sufficient to settle with those whose appraisements were reduced on account of the limit placed by law. A bill was introduced in the legislature for the purpose of obtaining this sum to pay these claims, but for some unknown reason it never got out of the Committee to which it was referred. Every legislator spoken to on the subject thought it was justly proper that the State should pay full market value for all animals destroyed for the protection of the public. The greatest injustice under the old appraisement was the amount allowed by law for sheep and hogs. The limit was $10.00 per head, while the value of many purebred hogs and sheep is many times this amount.

During the past year some states have set aside certain amounts to meet emergencies like foot-and-mouth disease. Colorado has made it possible for the State to issue certificates that shall be paid by the next legislature. These certificates are bankable and bear four per cent. interest, and are much more desirable to those who meet losses of this kind.

Pennsylvania has paid its share for all animals and property destroyed on account of foot-and-mouth disease; yet in some cases it was difficult to convince owners that this would be done. The records of Pennsylvania show that every just claim for animals destroyed on account of foot-and-mouth disease in each outbreak have been paid to the full extent of the law. The Federal Government has paid its share in full and in some cases more promptly than it was possible for the Board to do so. In some cases embarrassment was caused for the reason that money could not be paid at once for animals that were destroyed. In a few cases the herds had been attached by the sheriff before they were condemned and some difficulty was experienced in handling herds of this kind.

The Board should be provided with funds sufficient at all times to meet emergencies. It is necessary to hire additional help, much of which is day laborers and such people with those who have property destroyed, can ill afford to wait for settlement.

Fortunately, this outbreak occurred just before the session of the legislature. Had it occurred a year later most of our people would have been compelled to wait for settlement for indemnity for a year or more. This would have necessitated a hardship that could have been hardly borne by many who had herds destroyed.

The livestock in Pennsylvania is valued at something over one hundred and fifty million dollars. Those who are engaged in this industry are entitled to all the protection possible from transmissible diseases. In the past, Pennsylvania has been one of the most generous States in the Union in the matter of providing veterinary education and money to handle the diseases of livestock, and it is hoped that she will continue to furnish this needed protection and encouragement to one of her most valuable branches of industry.

The statistics in reference to handling the disease are shown in the following table:

SUMMARY OF APHTHOUS FEVER WORK IN PENNSYLVANIA 1914-1915

County	Herds	Owners	No. Animals Appraised			No. Animals not Appraised			Date of infection.	Disinfection completed
			Cattle	Sheep	Swine	Cattle	Sheep	Swine		
Adams,	12	12	311	3	228	......	......	56	11-10-14	1-18-15
Allegheny,	58	62	1,173	1	136	4	......	54	10-31-14	4-24-15
Beaver,	1	1	4	......	2	......	......	......	11-10-14	12-29-14
Berks,	125	131	1,701	25	1,145	1	......	354	11- 5-14	2-12-15
Butler,	1	1	16	......	4	......	......	......	3- 3-15	3-10-15
Bucks,	32	32	406	2	443	......	......	29	11- 9-14	3-12-15
Carbon,	2	2	14	......	13	......	......	......	11- 9-14	1 -8-15
Chester,	44	46	1,042	2	426	1	6	57	11- 4-14	3-26-15
Columbia,	1	1	24	......	23	......	......	......	11- 9-14	12-16-14
Cumberland,	13	14	231	33	236	1	......	74	11- 8-14	4- 2-15
Dauphin,	22	23	517	12	169	......	......	11	11- 9-14	3-16-15
Delaware,	7	8	175	......	58	......	......	14	11- 4-14	3-20-15
Erie,	4	4	86	12	39	......	......	......	2-18-15	4-28-15
Fayette,	1	1	17	......	8	......	......	......	2-17-15	3- 5-15
Franklin,	6	6	153	17	206	......	......	20	11- 6-14	1- 1-15
Huntingdon,	1	1	1	......	......	......	......	......	12-19-14	1- 9-15
Indiana,	1	1	11	......	9	......	......	......	2-16-15	2-27-15
Jefferson,	5	7	89	6	22	......	......	......	3-11-15	4- 8-15
Lancaster,	192	217	4,694	69	1,504	25	1	624	10-29-14	3-20-15
Lebanon,	40	43	830	......	320	9	......	219	11- 5-14	4-29-15
Lehigh,	4	4	62	......	44	......	......	9	12- 8-14	3- 5-15
Lycoming,	9	9	110	......	30	......	......	24	11-15-14	1-16-15
Mifflin,	2	2	48	13	14	......	......	6	11-25-14	1- 9-15
Mercer,	1	1	9	......	30	......	......	......	2- 1-15	2- 9-15
Montgomery,	87	96	1,476	54	1,203	4	......	177	11- 3-14	3-16-15
Montour,	4	8	197	......	66	......	......	......	11- 9-14	1- 3-15
Northampton,	12	18	170	......	60	......	......	......	11-18-14	3- 1-15
Northumberland,	3	3	39	......	28	......	......	5	12- 2-14	3-23-15
Perry,	2	2	45	......	70	......	......	......	11- 9-14	1- 5-15
Philadelphia,	19	29	108	......	3,635	......	......	8	11- 6-14	5-29-15
Schuylkill,	19	22	149	4	86	......	......	123	11-13-14	4-16-15
Warren,	1	1	2	......	......	......	......	......	4-25-15	4-29-15
Westmoreland,	5	5	431	1	52	......	......	......	11-10-14	3-15-15
York,	52	53	780	118	726	......	......	106	11- 4-14	3- 6-15
Totals,	788	866	15,121	373	11,035	45	7	1,970		

No. counties in State, 67.
No. counties infected, 34.

TEXAS FEVER

No cases of Texas fever have occurred for two years. Twenty-one slaughter houses in the State held permits from the Board for receiving Southern cattle for slaughter during the closed season. It appears that the State has but little to fear in the future from this disease. It is well-known how it spreads and the good work being done in the Southern states by the Federal Bureau of Animal Industry in exterminating it is showing good results. The infected territory is being rapidly cleaned from this infection. In a few years the United States should be entirely free from this scourge.

MANGE

Mange in sheep, cattle and horses is included in the list of reportable transmissible diseases. We have very little trouble with mange or scab in sheep. One reason is the fact that Pennsylvania is not engaged extensively in sheep raising. There are signs that our people will give more attention in the future to this profitable branch of animal industry. Most complaints heard in Pennsylvania in reference to the sheep question are not on account of diseases but from the ravages and extensive losses caused by dogs. Many more people would keep sheep if their neighbors would keep fewer dogs, or those they do have at home where they belong.

In sheep raising countries mange is an important disease. It depreciates the value of each animal affected about one dollar. France has practically 1,000,000 head of sheep affected annually. It is said that this disease virtually ruined the sheep industry in Iowa a few years ago.

Mange in cattle and horses is reported occasionally. It is easily cured if taken in time. Old chronic cases are extremely obstinate. All infected animals should be promptly isolated and treated with the lime and sulphur wash or some other parasiticide. The disease should be reported to the Board and suitable instruction will be furnished for handling the affected animals and premises.

The following table shows the extent of mange reported in horses during the past two years:

MANGE

Counties	No. of Cases Reported		No. of Animals Examined		No. of Animals Quarantined	
	1914	1915	1914	1915	1914	1915
Armstrong,	2	0	9	0	4	0
Bucks,	4	0	20	0	4	0
Cambria,	13	2	43	8	22	3
Chester,	0	1	0	4	0	0
Cumberland,	1	0	13	0	13	0
Indiana,	0	2	0	19	0	5
Lackawanna,	3	1	6	1	3	1
Lancaster,	2	0	8	0	8	0
McKean,	7	1	15	5	7	1
Monroe,	1	0	1	0	0	0
Philadelphia,	12	6	102	20	21	1
Potter,	1	0	4	0	1	0
Total,	46	13	221	57	83	11

HOG CHOLERA

Hog Cholera is supposed to have made its appearance in America in 1833 in the State of Ohio. It spread over the United States with the development of shipping facilities. In 1913 it existed in 52 of the 67 counties of Pennsylvania. This State is not heavily infested as compared with the recognized hog raising states. The 1912 Federal census indicates that there were 1,130,000 hogs in this State at that time. Our records for 1913 show that .02% of the hogs of the State were exposed to infection with a loss of .008%.

For practical purposes the disease may be divided into two forms; the acute and chronic. In cases of the acute form the animal may die without the owner noticing signs of illness. A post mortem may be held and no diseased organs or tissue found. These cases are due to a very active form of infection. Death is due to septicemia.

Animals affected with the chronic form present an entirely different appearance. These cases are the most common and are easily recognized. The animal has a high fever, ranging from 104.5 to 107 or higher. There is a discoloration of the skin over the abdomen under the thighs, front legs and around the ears. The animal shows an inclination to bury itself under the straw and in cold weather arches its back, shivers and usually avoids the rest of the herd. The hind feet are kept close together or crossed. There is loss of appetite, diarrhoea or constipation, cough, rapid loss or flesh, difficult breathing, wobbly gait, gummed condition of the eyelids and sometimes a discharge from the nostrils. No one set of symptoms are always presented and to be relied upon to determine whether or not an animal is affected with hog cholera. Any of the above symptoms may or may not be present.

The skin of a hog that has died of cholera is usually red or purple. On opening the carcass blood is found in the tissue just under the skin. The lymph glands, or "kernels" as they are sometimes called by the stock owner, are swollen, inflamed and sometimes bloody. The lining of the chest and abdominal cavities may be inflamed and covered with small blood spots. The lungs and intestines are inflamed. In some cases the lungs show that the animal had suffered from pneumonia and along the inside of the intestines, button shaped ulcers may be found. The kidneys are inflamed and their surface is speckled like a turkey's egg.

In the first described or acute cases of cholera, death is due to hog cholera infection alone. In chronic cases death is due to the presence of other organisms which are found in the normal hog's carcass but are kept in check by the animal's natural resistence. They overcome this resistance and cause tissue destruction and other symptoms of disease only when the animal's vitality has been reduced by the hog cholera infection.

The acute form of hog cholera is due to cholera infection which is a filterable virus. The organisms are so small that they cannot be seen under the most powerful microscopes. They pass through the finest porcelain filter.

The chronic form of hog cholera is due, first, to the filterable virus, but the conditions that are so noticeable are due to other bacteria: Principally bacillus suipestifer and bacillus suisepticus. The former, bacillus suipestifer, causes the ulcerations on the intestinal mucous membrane, the necrosis of tissue, and the swelling, inflammation, etc., of the lymph glands. The latter, bacillus suisepticus, cases the lung lesions.

It is not unusual for those who have had limited experience with hog cholera to fail to recognize the disease in some instances. A number of hogs may die suddenly and practically no signs of disease will be found when a carcass is opened. Another may lose a number of hogs all of which showed every indication of having pneumonia and the lungs are found affected when the carcass is opened. No other signs of disease are found and the inexperienced man would be led to believe that he was dealing with a contagious form of pneumonia or might term it, as was formerly the practice, an outbreak of swine plague. There is a third class of cases frequently found. The symptoms of disease shown before death, together with the findings when the carcass is opened, (such as necrotic areas, ulcerations of the intestinal tract, etc.) make up the case that is easily recognized as hog cholera.

Infection will live for a long time outside of the hog's body. Premises that have been occupied by infected hogs may be unsafe for other hogs for a number of months if the carcasses of the hogs have not been properly disposed of and the premises cleaned and disinfected.

It is not necessary for a hog or pig that develops hog cholera to have come in direct contact with an animal suffering from the disease. It is easily carried on the shoes, clothes or hands of a person who has been caring for sick animals. It may also be carried by streams, dogs, cats, rats, birds, barnyard fowls, the man who goes from place to place castrating pigs, livestock buyers, the dead animal remover, stock cars, stockyards, stockyard manure, cattle from stockyards, meat scraps in garbage, etc.

Since there is no known cure for hog cholera it is important that every precaution be taken to prevent the animals from becoming infected. Various drugs and combinations of drugs have been employed in the treatment of hog cholera and all have failed to cure sick animals or prevent well ones from becoming infected. Various kinds of patent preparations have been put on the market and extensively advertised as sure cures or sure preventatives. They have failed to produce the results that their manufacturers claimed for them.

An animal in good physical condition can resist more infection than an animal in a run down condition. A well balanced ration should be fed. Animals should have plenty of exercise, fresh clean water, shade in the summer, shelter in the winter, well ventilated and dry quarters. The premises should be kept clean. A liberal amount of air-slacked lime should be spread about the pens and hog lots.

For toning up hogs that are not thrifty the formula developed and tried out by the Federal Bureau of Animal Industry in 1905 is suggested:

Wood charcoal,	one pound
Sulphur,	one pound
Sodium chloride,	two pounds
Sodium bicarbonate,	two pounds
Sodium hyposulphite,	two pounds
Sodium sulphate,	one pound
Antimony sulphide (black antimony),	one pound

Pulverize each ingredient and mix thoroughly. The dose is a large tablespoonful for each 100 pound weight of hogs to be treated. It should be given in the feed once a day.

Newly purchased animals, boars standing for public service, sows that have been away to be bred and animals returning from the shows should be kept in quarantine on an isolated portion of the premises for three weeks. If they are not showing signs of illness up to that time they should be given a thorough scrubbing in a 2% Cresol Compound (U. S. P.) or 2% creolin solution (about two and one-half ounces of either to the gallon of water) and then placed in their permanent quarters. A hog owner should not visit premises where hogs are known to be sick, neither should he permit strangers in his hog pens or lots. Pens and lots should be so located that they do not border on a railroad or public highway. Dogs, cats, barnyard fowls and as far as possible rats should be excluded from the hog quarters.

If a sick hog is discovered it should be removed from the drove and placed in temporary quarters in an isolated spot. In winter it should be kept in warm, dry quarters and in summer the quarters should be cool and well shaded. If the animal recovers entirely in the course of a hay or two it may be returned to the drove. However, if it does not respond to treatment and shows any symptoms that are suspicious for cholera or if additional animals are taken sick a qualified veterinarian should be called in order that there may be no time lost in finding out whether or not the animals are affected with cholera.

The object in removing the sick animals from the herd is to prevent the infection of the other animals, if possible. It, therefore, follows that the person taking care of the sick animal should not go near the remaining hogs and pigs. Another advantage in providing temporary quarters for the sick animals is that they can be burned if desired.

If it is cholera the veterinarian should immediately report the case to the Board as required by law. He will give the name and address of the owner and the approximate weight of all apparently healthy hogs and pigs that have been exposed to infection. The report should be made over the phone or by telegram. To keep down expenses the telegram may read as follows: "State Livestock Sanitary Board, Harrisburg, Pa. Hog Cholera, Smith premises. Five thousand pounds. John Blank." Immediately upon receipt of such a report serum will be supplied free of cost, the veterinarian to be paid by the owner. In most states the owner must pay one to two cents per C. C. or on an average of about sixty cents per animal for serum, in addition to expressage and the veterinarian's fee. Pennsylvania owners must agree to submit a report of the results obtained from vaccinations, observe the provisions of the quarantine order, properly dispose of the carcasses of all hogs and pigs that die upon his premises and clean and disinfect his premises as instructed.

Report blanks and orders of quarantine are sent when the serum is supplied. One portion of the report blank is filled out by the veterinarian and forwarded to the Harrisburg office in order that a complete history of the case may be placed on record. The second portion is filled out by the veterinarian as far as to give his name, the date of vaccination, the number of hogs vaccinated, their temperature, weight, the serial number of the serum used and the amount injected into each animal. This blank is then placed in the hands of the owner and he is expected to finish filling out the blank and forward same to the Harrisburg office thirty days from the date of disposal of the last case of hog cholera. All that is necessary for the owner to do is to record in the vacant column whether or not each animal is dead or alive, sign, date and mail the report. Space has been provided for each point that the owner is to cover.

The quarantine restrictions do not inflict a hardship on stock owners as it does not tie up other stock nor their products. It covers only hogs and pigs and the refuse from the hog pens and hog lots. The quarantine order is read and explained to the hog owner, then posted in a conspicuous place. This protects other stock owners who will be warned to keep away. It requires the owner to keep his hogs confined and prohibits him from selling or otherwise disposing of hogs or pigs while the quarantine remains in force, unless permission is granted in writing by the Board. The owner is expected to observe every possible precaution to prevent the spread of the disease. All manure, litter, etc., removed from the hog pens and hog lots must be burned or mixed with lime and spread on an isolated field where it will be plowed under as soon as possible.

The law requires that the carcass of any animal that dies of a transmissible disease must be buried, cremated or boiled. If cremated the entire carcass with all its parts and products must be reduced to ashes. If boiled it must be kept boiling continuously for at least two hours. If it is not practicable to either cremate or boil the carcass, it and its parts and products may be buried in a place that shall not be subjected to overflow from ponds or streams, and which shall be distant not less than one hundred feet from any watercourse, well, spring, public highway, house or stable. Carcasses must be covered with quicklime to a depth of not less than three inches, and the uppermost part of such carcasses shall not be within two feet of the surface of the ground when the grave is filled and smoothed to the level of the surrounding surface. The grave must be so protected that the carcass will not be accessible to dogs or other animals.

Disinfectants such as carbolic acid, bichloride of mercury, etc., have not proven satisfactory in destroying hog cholera virus in hog pens and lots. A thorough cleaning and disinfecting of hog premises can best be accomplished by scraping the walls and floors. The material gathered, together with all manure and litter from the hog pens, should be burned or thoroughly mixed with lime and hauled to an isolated field where it will be plowed under as soon as possible. If the floors are old boards they should be taken out and burned. The earth under the boards should be taken off for several inches and treated the same as the manure and litter. If the floors are of earth only, several inches should be taken off, mixed with lime and turned under. The ceiling, walls and floors should then be saturated with a solution of Cresol compound (U. S. P. Liquor Cresolis Compositus) four ounces to the gallon of water. After this has dried the pens should be whitewashed with a solution of whitewash to which has been added chloride of lime in the proportion of one pound to three gallons. Air slacked lime should be thickly spread over the floor and ground.

The wagon and utensils used in hauling hogs that have died with cholera and spreading the manure, litter, etc., should be disinfected by repeated washings with a solution of cresol compound of the strength recommended above.

In 90 per cent. of the instances where a number of hogs or pigs become ill and several die the losses may rightly be attributed to hog cholera.

It is very important that outbreaks of hog cholera be reported without delay, because the best results from the use of hog cholera serum can only be obtained when it is used upon animals that are not showing the recognized symptoms of the disease.

It is easy to understand why hogs should be vaccinated as soon as possible because the serum protects against the virus of hog cholera only. If time is lost your are not only fighting hog cholera infection but other disease germs; the bacillus suipestifer, bacillus suisepticus, etc. Hog cholera serum will not check the action of these bacteria, neither will it aid the body in repairing the damages that they have done. This explains why the Board advises against the vaccination of hogs that are showing advanced symptoms of hog cholera. The majority of such hogs die in spite of treatment, and those that recover would do as well without serum. If the animals do recover it takes a long time to fatten them and it is a question if they will ever prove profitable. It must also be remembered that as long as a man keeps cases of chronic hog cholera he is keeping the disease active upon his premises because the sick animals throw off infection in their manure, urine, etc. It is a better proposition to kill and properly dispose of all hogs that are showing marked symptoms of cholera.

The fact that hog cholera serum will not cure animals that are affected and will not protect for more than a month or six weeks, unless the animals pick up a certain amount of infection at the time they are vaccinated, shows that the serum treatment has its limitations. The injection of sick hogs gives very disappointing results and not only wastes serum but discredits the serum treatment. Hogs that are becoming sick, whose temperature is going up for the first time, may be injected with good results.

The serum virus, or double treatment consists in the injection of a small amount of hog cholera virus immediately followed by the injection of hog cholera serum on the opposite side of the body. The idea is to confer a permanent immunity in the animal treated. A small percentage of animals so treated die with hog cholera. Others develop a slight attack of the disease but recover. Most of the properly treated animals are not disturbed by the treatment.

The serum alone or single treatment, as the name implies, consists in injecting hog cholera serum only. Since hog cholera serum does not contain disease producing material, is simply a hog blood plus a little anitseptic, it can do not harm.

In states where great numbers of hogs are raised and where most premises are infected no serious objection can be raised to the serum virus or double method of combatting the disease. The hog owners are not infecting clean premises when they lose a few hogs or have a few mild cases of hog cholera develop following the double injections. Neither is it of such great importance if the animals that are treated by this method become permanent producers of hog cholera virus.

Pennsylvania has whole counties that are free from hog cholera and a great number of counties in which the infected district is very limited. In our worst counties not even a third of the farms have had hog cholera upon them. We are able to control or eradicate the disease by sanitary precautons, quarantine restrictions and the use of the serum or single treatment. We do not feel justified to use the double method broadcast in this State.

The law prohibits the injection of any disease producing organisms into a domestic animal in Pennsylvania, without permission from this Board. The use of the serum-virus or double method is illegal except when carried out under permit.

If we use the double treatment we will have to keep on vaccinating the young stock and newly purchased animals from year to year. This expensive procedure would have to be kept up indefinitely and a man would not only be harboring infection upon his premises but would be a constant source of danger to his community and possibly to any section into which his hogs were shipped.

Hog cholera was reported from sixty counties during the year 1914 and fifty-five counties in 1915. It occurred in some parts of the State that in former years were considered free. The losses were only about one-half as much as in former years. Those who are engaged in hog raising are becoming more familiar with the symptoms of the disease; what to do when it occurs and how to prevent it. When the disease is reported early in an outbreak the Board is able in most cases to prevent its spread and save most of the animals in a herd.

Upon receiving information of an outbreak the local veterinarian is furnished serum, free of charge. If the veterinarian is satisfied that the disease is cholera he administers serum to all hogs in the herd that show no symptoms of the disease and also to those that are sick but in which the animal is not so sick but what it may recover. In many hog raising states cholera infected blood is injected into those showing no symptoms at the same time the serum is given. Immunity is produced by this method that will last for a year or more. Our experience has shown that sufficient infection is picked up naturally by susceptible hogs in an infected herd to produce just as sure and lasting immunity and there is less danger of spreading the infection. The percentage of losses subsequent to vaccination during the last year was a fraction less than twenty-one per cent. These figures include all losses, including pigs.

A number of requests have been received to vaccinate hogs on other farms in a neighborhood when the disease breaks out in a nearby herd. This request is seldom complied with for the reason that if reasonable precautions are taken to prevent carrying the infection the disease will be avoided. Serum alone given in such cases will produce immunity that will last but about one month. After this time they are again susceptible to the disease. If the infection is injected with the serum they will have a longer immunity; but a herd so vaccinated is an infected herd. The plan is expensive and under usual conditions is unnecessary for the reason that the herd should not become infected if it is not vaccinated. This plan of immunization may be necessary in communities where the disease is wide-spread and always present. Fortunately Pennsylvania has never been afflicted with such territory. We believe that it never will be if our people continue to exercise the good judgment in the future that they have shown in the past. Everything possible should be done to prevent infection and where it does occur it should be destroyed as soon as possible. Neither requisite is impossible.

The following is a record of the amount of serum on hand at the beginning of the year, the amount produced and used during the years 1914 and 1915:

Approximate amount of serum in stock December 31, 1913,	232050	C. CM.
Amount produced during 1914,	665860	"
Approximate amount disposed of during 1914,	720460	"
Approximate amount in stock December 31, 1914,	177450	"
Amount produced during 1915,	606900	"
Approximate amount used during 1915,	652050	"
Amount in stock December 31, 1915,	132300	"

There is no doubt but what hog cholera and other diseases have been spread by the injudicious use of vaccination. Up to the present time the Board has been able to produce a sufficient amount of serum to meet the demands. It has been distributed free of expense to the owner. There is no occasion for our people to purchase serum and take the chance of getting a product that is impotent or that may be the means of spreading this or some other dangerous disease.

It is pretty well understood that there is no medicine on the market that will cure hog cholera and there are no proprietary medicines that will prevent it. During the year considerable was heard about an advertised prevention and cure known as "544." This was prepared and sold by the Theile Laboratories of Columbus, Ohio. So much was heard about this new treatment that it was decided advisable for the Board to test its merits.

Three hogs were taken, No. 4919, No. 4920 and No. 4921, weighing 120, 115 and 60 pounds respectively. Hog No. 4919 received 6 c. c.; No. 4920, 5½ c. c., and No. 4921, 3 c. c. of "544" intramuscularly; this being the proportionate dose recommended in the sheet of instructions as an immunizing dose for well hogs. They were injected on October 2, 1914, at which time the temperatures were 101.4, 100.4 and 102 respectively. They were then placed in an infection pen, and between October 8th and October 14th showed clinical symptoms of hog cholera—diarrhoea, dullness, decreased or loss of appetite, more or less reddening of the skin, and weak and staggering gait—while the temperatures in that time had risen to 106 degrees and ranged between that and 107 until October 15, when they were killed for virus.

In the pen with these animals were placed three other hogs, No. 4922, No. 4923, No. 4924, as check or control animals on the three treated hogs. These weighed 118, 60 and 58 pounds respectively. No. 4922 and No. 4923 became sick, showed dullness, diarrhoea and temperatures of 105.8 and 106.2 on October 9th. On October 10, they were both given "544" to try to prove its curative value. No. 4922 received 12 c. c. and No. 4923 6 c. c. intamuscularly. No. 4924 showed a rise in temperature to 106.2 degrees on the 10 of October. On the 11, showed 106.4 and on the 12th 106.1 when it was given 6 c. c. of "544" intramuscularly. No. 4922 died October 13th, No. 4923 was killed October 15th for virus. No. 4924 died October 17th. All six of these animals were carefully autopsied and showed typical postmortem lesions of hog cholera, including enlarged and hemorragic lymph glands, enlarged spleen with subscapular hemorrhages, hemorrhagic areas in the lungs, petechiated kidneys; hemorrhagic inflammation of the stomach and intestines, and in some of the cases beginning ulceration around the ileocaecal vale and in the large intestines.

The temperature charts and autopsy records are on file. From the results obtained, "544" is of no value, either as prophylactic or curative agent for the treatment of cholera in hogs.

Ordinarily hog cholera is easily diagnosed from its history and symptoms. When a number of hogs have died in a herd the cause can safely be attributed to hog cholera. Occasionally mistakes are made. The average man is less likely to recognize the disease when it does occur than he is to diagnose some other disease as cholera.

In one case during the year a diagnosis of hog cholera was made by the local veterinarian and subsequently it was learned that the hogs had what is known as cottonseed meal poisoning. It is not a common custom to feed cottonseed meal to hogs in this State and for this reason it is not generally known that it is not safe to feed it in a comparatively large amount for a long period at a time. The owner of the herd in question had been feeding a mixed grain ration consisting of one part cottonseed meal to seven parts of cob meal and wheat bran combined for a period of about three months. The hogs were in what appeared to be fine physical condition. Suddenly they began to die mysteriously. In many cases they would eat one meal and appear well but would die before the next feeding time. They had a high fever and difficult breathing a short time previous to death. They apparently died from suffocation. On autopsy they showed an enormous amount of straw colored serum in the cavity around the lungs but no lesions common to hog cholera. A sample of the food was taken to the State Farm and fed to four hogs. They did well for about three months on this food and then died with the symptoms and lesions mentioned above. The losses in the original herd ceased as soon as the cottonseed meal was removed from the ration. This is similar to beri-beri, a disease in the human family caused by eating highly milled rice.

The following table shows the statistics of hog cholera in the State during the two years:

HOG CHOLERA

Counties	No. Animals Examined		No. Animals Showing Symptoms		No. Animals Died Previous to Vaccination		No. Animals Vaccinated		No. Animals Died Following Vaccination	
	1914	1915	1914	1915	1914	1915	1914	1915	1914	1915
Adams,	28	2	28	0	19	0	18	2	16	0
Allegheny,	183	313	66	79	37	83	169	187	69	60
Armstrong,	71	106	60	60	45	31	16	61	7	12
Beaver,	117	56	19	14	22	24	89	36	11	2
Bedford,	107	57	14	50	51	45	70	2	6	1
Berks,	613	542	112	247	84	180	590	363	68	77
Blair,	252	265	39	35	87	4	220	253	40	22
Bucks,	653	314	267	116	79	105	577	272	119	111
Butler,	65	37	44	10	8	7	58	44	17	2
Cambria,	159	618	98	55	75	22	70	562	27	36
Carbon,	278	210	39	38	23	31	265	205	18	7
Centre,	169	9	38	3	47	2	74	0	3	0
Chester,	1,232	774	255	194	139	63	1,075	680	223	137
Clarion,	8	8	8	8	2	5	8	0	2	0
Clearfield,	7	0	7	0	0	0	0	0	0	0
Clinton,	17	105	13	10	8	14	7	56	3	48
Columbia,	89	81	33	41	15	17	74	67	19	15
Crawford,	59	52	41	39	8	16	35	27	27	6
Cumberland,	712	753	140	156	95	103	639	692	247	212
Dauphin,	111	400	25	153	28	17	109	357	24	139
Delaware,	2,517	1,737	305	257	207	205	2,173	1,430	247	215
Erie,	212	17	90	16	74	10	153	0	106	0
Fayette,	133	124	43	83	35	48	83	86	22	39
Franklin,	256	2,000	52	456	23	233	151	1,195	12	139
Greene,	90	64	39	5	27	1	22	24	1	2
Huntingdon,	222	350	54	41	21	24	198	316	49	17
Indiana,	175	112	139	58	82	25	74	94	12	21
Juniata,	50	16	13	16	28	4	36	16	15	1
Jefferson,	0	55	0	21	0	16	0	55	0	13
Lackawanna,	86	218	10	21	7	7	17	207	15	10
Lancaster,	798	156	226	36	162	39	603	138	173	24
Lawrence,	76	27	36	18	38	6	72	27	8	17
Lebanon,	408	266	104	106	85	58	357	232	45	75
Lehigh,	240	571	31	168	81	198	155	430	30	131
Luzerne,	25	263	16	76	1	47	10	198	0	27
Lycoming,	424	194	90	46	50	40	271	180	104	45
McKean,	74	55	22	8	50	32	53	45	10	21
Mercer,	247	66	120	29	38	8	196	39	72	4
Mifflin,	31	16	13	12	22	12	27	10	9	8
Monroe,	70	5	66	0	12	0	70	5	60	0

Montgomery,	906	1,883	345	503	239	361	682	1,226	204	331
Montour,	219	108	49	61	28	13	192	88	18	20
Northampton,	443	569	190	184	198	89	368	328	52	92
Northumberland,	350	324	106	45	51	32	258	298	35	27
Perry,	32	40	6	18	4	0	10	33	10	6
Philadelphia,	198	660	11	125	24	126	[illegible]	548	6	90
Potter,	6	0	1	0	5	0	5	0	3	0
Schuylkill,	85	478	38	157	10	88	[illegible]	274	19	146
Snyder,	199	0	96	0	52	0	101	0	35	0
Somerset,	288	575	1	15	0	25	282	570	0	2
Sullivan,	60	0	0	25	8	24	6	25	0	1
Susquehanna,	42	0	0	0	60	0	34	0	0	0
Tioga,	7	57	7	25	0	24	7	25	0	1
Union,	49	50	2	12	41	2	25	46	6	11
Venango,	28	61	11	3	4	0	18	47	9	2
Warren,	408	10	24	10	93	0	221	0	6	0
Washington,	515	79	183	58	104	13	368	47	109	24
Wayne,	14	0	13	0	5	0	14	0	9	0
Westmoreland,	287	110	130	55	134	25	210	85	58	26
Wyoming,	9	38	3	23	4	45	6	26	5	3
York,	1[illegible]2	[illegible]	26	204	49	161	92	234	9	67
Totals,	15,330	16,650	4,057	4,472	3,128	2,876	12,085	12,460	2,529	2,602

CHOLERA OF CHICKENS

Among the many diseases of poultry, the only one recognized by our law is fowl cholera. The Board is authorized to look after other transmissible diseases of poultry at any time when it seems advisable to do so. It is a malignant transmissible disease of all species of birds and is caused by micro-organisms easily found in the blood of diseased birds. The organism is known as the bacillus avisepticus. The disease is characterized by high fever, profuse diarrhoea and rapid death. In most cases the death rate runs as high as 90 to 100 per cent. It is primarily a European disease yet it occurs in the United States and Canada. It made its appearance in this country in 1880 and again in 1898. Dr. Salmon, the late Chief of the Bureau of Animal Industry, made a careful study of the disease and gave the results of his investigation in the Annual Reports of the Department of Agriculture in 1899. The disease is mentioned in the Pennsylvania law for the reason that it is a destructive preventable disease of poultry and all precautions should be taken to prevent its introduction or spread. Poultrymen and veterinarians are urged to report fatal outbreaks of transmissible diseases of poultry, especially where the cause of death or the character of the disease is unknown so that such disease as cholera may be recognized before they become wide spread. The Board is equipped to do much more in the future than in the past in the way of investigating the diseases of poultry. Poultry raising is fast becoming an important branch of agriculture and all safeguards possible should be thrown around this industry.

The following tables will show the most important diseases of poultry studied during the past two years:

DISEASES OF POULTRY INVESTIGATED AT THE LABORATORY DURING 1914

Diagnosis Determined	Peafowl	Chickens	Ducks	Turkeys	Guinea fowl	Pigeons	Canary	Geese	Pheasants
Pneumonia,	2	8							
Enteritis,		2							1
Internal hemorrhage,		1							
Roup,		7							
Hepatitis,							1		
Typhilitis,		1							
Carcinohatosis,		1							
Tuberculosis,		2		2					
Abdominal cysts,		1							
Coccidiosis,		2			4				
Contagious epithelioma,		8							
Hernia of gizzard,		1							
Aspergilosis,		1							
Peritonitis,		1							
Entero hepatitis,				1					
Fatty degeneration of liver,		1							
Neg. fowl cholera,		1							
Returned,									1
Not determined,		28	111			2		1	1
Decomposed and discarded,		6		1					
Miscellaneous,		3							
	2	75	111	4	4	2	1	1	3

DISEASES OF POULTRY INVESTIGATED AT THE LABORATORY DURING 1915

Diagnoses Determined	Quail	Ducks	Turkeys	Hens	Grouse	Pheasant	Pigeons	Duck eggs
Received alive, returned O. K.,	4	......	......	2	......	......	......	......
Enteritis,	......	2	......	2	......	......	......	......
Hemorrhagic enteritis,	......	2	......	1	......	......	......	......
Suppurating abscess,	......	......	......	1	......	......	......	......
Foreign body abscess,	......	......	1	......	......	......	......	......
Contagious epithelioma,	......	......	2	......	......	......	......	......
Quail disease,	18	......	......	......	......	......	......	......
Peritonitis,	......	......	......	......	......	......	1	......
Internal hemorrhage,	......	......	......	......	......	......	......	......
Pneumonia,	......	......	......	1	......	......	......	......
Ruptured cloacae,	......	......	......	1	......	......	......	......
Fowl diphtheria,	......	......	......	2	......	......	......	......
Impaction crop,	......	......	......	1	......	......	......	......
Tuberculosis,	......	......	......	1	......	......	......	......
Feed experiment negative,	......	......	......	1	......	......	......	......
Museum,	2	......	......	......	......	......	......	......
Bacteriological experiment negative,	3	2	......	10	......	......	......	......
Diagnosis not established,	......	5	......	......	......	......	......	50
Decomposed and discarded,	20	......	......	2	1	1	......	......
	47	11	3	27	1	1	1	50

RABIES.

The rabies situation has been much improved. The wisdom and good results that followed the policy adopted in 1914, relative to the prompt establishment and rigid enforcement of general quarantines, is shown in the reduction of the number of cases of rabies. The reduction in our larger cities is particularly gratifying as it was brought about largely by the co-operation of the local police officials and the prompt enforcement of their dog ordinances.

Numerous cases of rabies in Pittsburgh and vicinity are not brought to our attention. About the only cases we are able to investigate there are from newspaper reports. Toward the close of the year satisfactory arrangements for the prompt reporting of all cases have been made with the officials of the city of Pittsburgh and the authorities of Mercy Hospital. As the result of this arrangement we hope to reduce the number of cases of rabies in that city as has been done in other large cities.

As in previous years, the methods used in determining the diagnosis proved entirely satisfactory. The methods given below outline the routine followed in diagnosing these specimens, and in following the same we are often able to make a report by telegram within an hour after the specimen is received.

1. Microscopical examination of smears from hippicampus major and cerebellum.
2. Microscopical examination of sections from hippicampus major, cerebellum, plexiform and sympathetic ganglia.
3. Diagnostic inoculations from hippocampus major and cerebellum.

If the first examination is negative, the material is examined by method No. 2. In case both No. 1 and No. 2 prove negative they are followed by inoculation according to method No. 3. This is done, however, only in case of persons having been exposed, or upon a request being made that diagnostic inoculations be carried out. It should be emphasized that while the presence of true Negri bodies is conclusive evidence of rabies, the fact that they are not found does not in itself eliminate the possibility of the presence of this disease.

In cases where microscopical examinations have proven negative and where we have a fairly good clinical history of rabies, we do not advise persons who have been bitten by a rabid animal to defer treatment until the results of diagnostic inoculation have been determined. Such persons are referred to their family physician for treatment and advice.

It has been observed for some time that when examining sections of brain tissue and the systematic and plexiform ganglia from an animal dead of rabies that there was a marked increase in the number of endothelial cells. In order to determine what percentage of the cases reported as positive to this disease following the finding of Negri bodies and showing endothelial cell proliferation, an experimental study of all such sections was begun. Several hundred cases have been examined. The results show a remarkable similarity, and we are convinced this is a valuable aid in diagnosing the disease, and the percentage of errors if this method alone was followed by an experienced investigator, would be very small. Realizing that the value of investigations of this kind depends largely upon the number of specimens examined, we shall continue to work on animals known to have died of rabies and also of those that have succumbed to some other disease. We trust the work may prove of scientific value.

When a positive case of rabies has been observed in a community one of the regular agents is sent immediately to make an investigation. All dogs known or suspected of having been bitten by the rabid animal within two weeks of his death are destroyed or placed in absolute quarantine for a period of 100 days. If a number of cases of rabies develop in the same locality within a short time a general quarantine is placed on the territory by the Board. This is seldom done unless the Board of Health or several representative citizens petition the Board for such a quarantine. Quarantine notices are then posted throughout the territory. The notice is also published in a local paper circulating within the territory. All dog owners are warned that their dogs must be confined. Those found roaming at large not properly muzzled may be destroyed by anybody. An agent of the Board is provided to see that the terms of the quarantine are observed. He is authorized and ordered to shoot all dogs that are found violating the quarantine. Such a general quarantine is usually in force for 100 days. No dogs are allowed to leave a quarantine area unless a permit is issued by the Board. Where valuable animals have been bitten by a rabid animal the Pasteur treatment may be given. This treatment is rather expensive and must be paid for by the owner. The results are not always good and this course should not be followed except in rare cases. When this plan of treatment is decided upon the animal must be kept carefully and securely quarantined and the treatment should begin as soon as possible after the bite.

The following table gives the detailed information regarding rabies during the two years:

RABIES.

Counties	No. Positive Cases Reported		No. Cases Reported but Demonstrated to be Negative		No. Animals Quarantined		Localities Quarantined		Animals Destroyed		Persons Bitten	
	1914	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914	1915
Adams,	5	3	1	3	123	14	1	0	6	10	1	4
Allegheny,	4	33	4	5	3	126	0	0	6	38	11	26
Armstrong,	1	1	0	1	0	4	0	0	3	3	0	3
Beaver,	5	1	3	0	105	19	1	0	5	0	2	7
Berks,	2	5	1	2	21	14	1	0	3	10	1	7
Bradford,	6	0	0	1	0	0	0	0	0	6	6	0
Bucks,	3	10	2	5	5	113	0	1	8	24	0	4
Butler,	0	5	2	0	0	28	0	0	0	0	0	0
Cambria,	6	8	4	6	12	21	0	0	6	1	10	9
Carbon,	1	2	0	0	13	3	0	0	1	1	1	2
Centre,	1	1	2	0	0	1	0	0	1	1	0	0
Chester,	8	14	4	6	107	127	0	3	12	940	2	11
Clarion,	2	0	0	0	16	0	0	0	10	0	2	0
Clearfield,	2	10	6	7	0	38	0	1	36	112	1	10
Clinton,	0	0	1	0	0	0	0	0	0	0	0	0
Columbia,	0	6	0	5	0	73	0	1	0	22	0	0
Crawford,	1	0	0	0	1	0	0	0	2	0	0	0
Cumberland,	0	2	0	3	0	12	0	0	0	0	0	0
Dauphin,	1	1	0	2	1	1	0	0	1	0	0	0
Delaware,	5	27	4	14	14	268	0	1	8	91	0	20
Elk,	0	0	0	1	0	0	0	0	0	0	0	0
Erie,	3	5	2	0	7	46	0	0	3	43	2	8
Fayette,	7	16	0	6	38	132	0	7	15	168	5	16
Franklin,	1	6	0	0	0	70	0	0	1	19	0	3
Greene,	2	1	2	0	38	0	0	0	44	0	0	0
Huntingdon,	0	0	0	0	0	7	0	0	0	2	0	7
Indiana,	2	4	0	2	19	379	1	0	5	20	2	1
Jefferson,	1	0	0	1	0	0	0	0	8	0	2	0
Juniata,	1	1	1	0	12	5	0	0	16	11	0	1
Lackawanna,	1	2	5	1	0	5	0	0	1	0	0	0
Lancaster,	3	2	3	3	5	28	0	0	15	9	1	2
Lawrence,	3	1	1	2	22	52	0	0	35	0	1	2
Lehigh,	0	0	0	1	0	0	0	0	0	0	0	0
Luzerne,	3	3	7	14	0	16	0	0	0	0	0	3
Lycoming,	0	0	1	0	0	0	0	0	0	0	0	0
McKean,	3	1	2	1	9	1	0	0	3	0	1	0
Mercer,	9	10	1	2	54	122	0	1	27	9	7	5

Counties.	No. Positive Cases Reported		No. Cases Reported but Demonstrated to be Negative		No. Animals Quarantined		Localities Quarantined		Animals Destroyed		Persons Bitten	
	1914	1915	1914	1915	1914	1915	1914	1915	1914	1915	1914	1915
Mifflin,	0	0	0	1	0	0	0	0	0	0	0	0
Monroe,	1	0	0	0	0	0	0	0	1	0	0	0
Montgomery,	14	23	3	7	63	131	1	8	115	102	1	18
Montour,	0	2	0	0	0	52	0	0	0	8	0	1
Northampton,	0	3	4	2	0	20	0	0	0	1	0	4
Northumberland,	3	4	2	3	95	51	1	0	7	6	0	9
Philadelphia,	38	85	28	54	15	54	0	0	40	51	21	50
Schuylkill,	4	5	2	3	17	19	0	0	5	13	2	8
Snyder,	1	0	0	1	4	0	0	0	1	0	0	0
Somerset,	2	1	1	0	4	0	0	0	3	0	3	0
Susquehanna,	0	0	1	0	0	0	0	0	0	0	0	0
Tioga,	2	0	2	1	0	0	0	0	2	0	2	0
Union,	0	4	0	1	0	86	0	3	0	25	0	5
Venango,	2	1	0	0	18	1	0	0	2	0	1	0
Warren,	1	0	0	0	82	0	1	0	20	0	0	0
Washington,	4	5	0	1	70	110	0	0	20	76	1	3
Wayne,	0	1	0	0	0	0	0	0	0	0	0	0
Westmoreland,	4	4	3	4	44	12	0	0	4	8	2	2
Wyoming,	0	0	0	3	0	0	0	0	0	0	0	0
York,	4	4	2	12	2	12	0	0	6	8	4	1
	165	327	107	187	1,039	2,273	7	26	507	1,832	89	252

RABIES —LABORATORY, 1915

Animal	Jan.		Feb.		Mar.		April		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.		Total
	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Neg.	Pos.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	Pos.	Neg.	
Dog	9	10	12	9	12	12	9	19	12	13	12	13	13	25	7	28	5	9	7	4	3	5	11	5	264
Cat	....	....	....	....	1	....	....	....	1	....	....	1	1	1	....	....	....	....	....	....	....	....	....	1	6
Mule	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	2
Horse	1	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	4
Cow	1	....	2	....	....	1	....	1	1	....	....	....	....	....	1	....	1	....	....	....	....	....	....	....	8
Calf	....	....	....	1	....	....	....	....	....	1	....	....	....	....	1	1	....	....	....	1	....	1	....	....	6
Bull	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
Sheep	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2
Hog	1	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2
Total	12	10	14	10	13	15	9	23	14	14	12	14	14	26	9	29	7	9	7	5	3	8	11	7	295

Table on this page combined with table on page 141-142.

DOURINE

Dourine or equine syphilis is a transmissible disease of horses conveyed from animal to animal by copulation. The true cause of the disease is a micro-organism known as trypanesome equiperdum.

The disease is supposed to have come originally from Syria and Asia. It has been spread to nearly all horse breeding countries. The first appearance of the disease recognized in this country was in DeWitt county, Illinois, in 1882. It was found in a stallion imported from France. From him it was spread to a number of brood mares and stallions in that section. Recently the disease was found in some of the Western states and had become quite widely spread before it was recognized. The United States Bureau of Animal Industry has the outbreak well under control. There is no cure for the disease and it is handled by quarantine and slaughter of all infected cases.

The first symptoms usually show on the generative organs. Red spots, vesicles and ulcers appear. There is a constant desire to urinate and the patient shows an increased sexual desire. Later eruptions appear on the skin and this is followed by paralysis. The disease runs a long course—usually from three months to two or three years. It usually proves fatal.

If symptoms of this kind should be observed in breeding horses, the condition should be reported promptly so a diagnosis can be made before the disease becomes widely spread. Up to the present time the disease has not been recognized in this State. The danger of infection is greatest in imported stallions and in brood mares from the northwestern part of the United States.

TUBERCULOSIS

The report on tuberculosis is intended primarily as a resume of field work; but no doubt some persons will be interested in it and the tuberculin test beyond statistical records.

During the past twenty years or more, this subject received so much attention and has been given such wide publicity, it would appear that all livestock owners should be well informed. Such however is not the case as we frequently find owners who have little or no knowledge of this disease, and others, who on account of improper information, do not realize its economic importance.

Many persons regard our work in the control of bovine tuberculosis as being specifically directed to the protection of public health, and demand such radical measures as would inflict a serious hardship on the livestock industry. Doubts have been expressed as to the utility of tuberculin testing only a small percentage of the cattle population of the State and permitting the large remainder to furnish milk and meat products for human food.

A conservative estimate has been made of the expense attendant upon a state-wide tuberculin test of dairy cattle and destruction of all reacting animals. The cost has been placed at upwards of five million dollars; in addition there would be a loss to the owners of about one and one-half million dollars above the amount of indemnity which could be paid by the State under the present law. This estimate does not include beef cattle and swine, in which classes of animals, tuberculosis is also of serious importance.

The primary and essential duties of the State Livestock Sanitary Board, as expressed by law are, protection of health of domestic animals and conservation of the livestock industry. It is through the medium of these primary and essential duties that public health is secondarily protected. It is this point that we desire to be thoroughly understood by all livestock owners; also that we wish to render them every assistance within our jurisdiction and resources.

We cannot render free veterinary service in all cases of animal ailments for the reason that it would be too expensive for the State and it would be an injustice to veterinary practioners who have prepared themselves for the profession and pay an annual license to the State. But we are always glad to co-operate with the attending veterinarian by personal service or the use of our laboratory. Our duties are largely limited to handling dangerous transmissible diseases which are enzootic and occasionally become epizootic.

Tuberculosis has never reached the proportions of an epizootic and probably never will, owing to its slowly progressive nature. But it is found to varying extent throughout the entire State. In the thickly populated dairy districts the percentage of affected animals is relatively large, while in other sections it is of irregular occurrence. In the dairy districts, where the economic importance of the disease is more fully realized, much attention has been given to its control by the use of the tuberculin test.

This has made its extent in such districts more apparent than real, as compared with other sections where the test is rarely employed. Although tuberculosis was not identified as a specific infection until 1865, it is not a new disease. Professor V. A. Moore in his work on the Pathology of Infectious Diseases of Animals states: "Tuberculosis is one of the oldest diseases affecting cattle of which there are any identifying records. It seems to have been known to the Jewish people during their Egyptian captivity and the ecclesiastical laws for many centuries contained numerous enactments against the consumption of flesh of tuberculous animals."

It is a transmissible disease common to man and animals, and has also been found in birds, fishes and reptiles; only in rare instances has it been found in horses and mules. Sheep are susceptible and will contract the disease if directly exposed to virulent infection, but under ordinary conditions enjoy a high degree of immunity.

Its greatest economic importance in relation to agriculture is the extent to which it is found in cattle and swine.

The disease does not arise spontaneously; every case has been caused by infection from a previous case. The causative factor is a microscopical germ which has been named the "bacillus tuberculosis." This germ gains entrance to the body and lodges somewhere in the tissues where it propagates and destroys healthy tissue by the irritant poisons which it execrates. The principal ways in which the germs gain entrance to the body are: Through the air, by breathing and by contaminated food or water taken into the digestive tract. Another mode of infection which is of less importance is through the medium of diseased sexual organs, either by copulation or during gestation. Only in comparatively rare instances does a tuberculous dam infect the offspring before birth. Such a mother may have healthy offspring at birth, but may impart to her progeny what is termed a tubercular diathesis or an hereditary predisposition to contract tuberculosis if exposed to the infection.

There are other predisposing conditions of body and environment which contribute to the development of this disease.

A weakened physical condition due to insufficient or improper food, insanitary housing, unusual exposure to inclement weather and the drain on the system of dairy cows caused by heavy production of milk, will undoubtedly cause lessened resistance and assist in the development of the disease after infection occurs.

A damp, crowded stable with insufficient light and ventilation, will prove a veritable hot-bed for the propagation of tuberculosis.

While it is apt to be found in virulent form in such a place, it is also found to a lessened degree in properly constructed and well kept barns, due to failure to take proper precautions against the introduction of the infection.

There are no positive characteristic physical or clinical symptoms of tuberculosis in the living animal. Any symptoms shown by a tuberculous animal may be exhibited by other diseases or caused by some derangement of physiological functions. For this reason diagnosis by physical examination is uncertain except in advanced cases. The onset of the disease is always unobtrusive and it usually progresses so slowly that no hint of its presence is given until some vital organ has become seriously affected. An animal may be infected in very early life and the disease remain latent until maturity. During this time the presence of the disease cannot be determined except by use of the tuberculin test. Any organ, or any set of organs may be attacked by tuberculosis; consequently in a consideration of suggestive symptoms, we must have regard for the normal functions of various organs in order to note physical changes which may be the result of impaired function.

An exaggerated importance is usually attached to the presence or absence of a cough in a suspected animal. In many instances, farmers will not entertain the idea that a cow may have tuberculosis unless there is a noticeable and persistent cough. On the other hand they will have grave suspicions of any cow which exhibits such a symptom. When we consider the numerous causes from which a cough may arise, the fallacy of accepting this as a constant or characteristic symptom is apparent. Coughing as a symptom of tuberculosis is only exhibited when the lungs or some other portions of the respiratory apparatus are effected. Even then it is not the loud, deep and frequent cough, which the layman naturally expects to hear, but rather subdued or repressed and infrequent; except in the later, advanced stages of the disease, when the animal may be racked by violent and continuous spells of coughing. A tuberculous cough is more apt to be noticed in the morning when the stable is first opened or when the animal is forced to exercise. Cows do not usually appear to cough up anything, but it will be noticed after coughing that they swallow, which indicates that some material has been raised from the lungs or air passages into the throat or mouth. While cows do not usually eject any coughed up material, many tuberculosis germs may escape from the mouth with the saliva in a fine spray or be discharged from the nostrils.

When an animal does not respond to proper food and care, and is persistently unthrifty and thin, with no apparent cause, we may suspect tuberculosis, especially if there is a history of tuberculous contact. The appetite may be normal or even excessive, but the animal does not gain in flesh in proportion to the amount of food consumed. Unthriftiness and emaciation are not always attendant upon advanced cases of tuberculosis. Recently a registered Shorthorn cow apparently in prime condition, weighing 1,700 pounds, was found after slaughter to have generalized tuberculosis. A registered Holstein bull, which dressed nearly 900 pounds was found to be similarly affected; in both cases there were no positive antemorten symptoms and the presence of the disease was not suspected until revealed by the tuberculin test. Such cases, while out of the ordinary, are not at all rare.

A gradual enlargement and hardening of the lymphatic glands, especially of the throat and udder, is frequently noticed and is often the first symptom which causes the suspicion of tuberculosis. Sometimes enlarged glands in the throat or chest region will cause attacks of "bloating" by pressure upon the gullet.

Scouring is usually only present when the disease has attacked the bowels. Persistent scouring which will not yield to treatment, justifies a suspicion of tuberculosis, but the diagnostician should bear in mind the possibility of other causes, especially Johne's disease which is also known as chronic bacterial dysentery.

The first appearance of tuberculosis in the udder cannot be detected by physical examination, but after a time hard lumps may be felt in some parts of the glandular tissue after milking. A cow with udder tuberculosis is a dangerous factor for the dissemination of the disease to both human and animal subjects.

Tuberculosis in hogs is usually not revealed until after slaughter. Its detection by physical examination and study of symptoms is more difficult than in the case of cattle. The intradermal tuberculin test has been used on swine to some extent with good results. They almost invariably contract the disease by ingestion of infected food. The chief cause of tuberculosis in swine is the feeding of skim milk and separator slop from creameries and cheese factories. This cause can be largely removed by heating the milk sufficiently to destroy the germs. Section 33 of the Act of July 22d, 1913, requires the operators of creameries and cheese factories to pasteurize skim milk and separator slop by heating to at least 178 degrees Fahrenheit before returning the product to patrons.

Another source of infection is feeding upon the droppings from tuberculous cattle. A high percentage of tuberculosis is found in hogs which have been fed upon refuse from slaughter houses.

A pig which has contracted the disease from a tuberculous mother may show marked symptoms of intestinal disturbances. It becomes stunted, pot bellied, thin and has a general unthrifty appearance. The appetite becomes variable, there is usually diarrhoea, bloating and sometimes vomiting. The course of active tuberculosis in young pigs is usually short, but may extend over a longer period in older ones. When the disease is localized and not sufficiently advanced to seriously interfere with the body functions, there are no noticeable symptoms.

Should the lungs become involved the breathing may become quickened and labored, with a dry troublesome cough. The lungs are seldom the first seat of attack but become affected after the disease has made considerable progress in the abdominal organs. The lymphatic glands, especially of the lower jaw and throat are frequently found affected, with no lesions in other organs. In one of our large abattoirs, out of a day's killing of about 6,000 hogs, 652 head were found to be infected only in the glands of the head and intestines, 26 head showed extensive lesions in other organs causing destruction of the carcasses.

The importance of this disease must be considered from three points of view, first, loss to the owner; second, effect upon the available food supply; third, the danger of communication to human beings.

The owner may sustain a gradual loss extending over a considerable period of time, by reason of the diminished milk production from certain of his cows in which the disease may be gradually advancing. The loss becomes evident when an animal dies of the disease or when an apparently healthy animal is slaughtered and found to be so badly affected as to be unfit for food.

When we consider the value of the many thousands of animals that die from this disease and the carcasses and parts of carcasses which are annually condemned, its effect upon the food supply must be apparent, as all such losses must ultimately fall upon the consumer.

The danger of communication to human beings is largely through milk from tuberculous cows. The many investigations which have been conducted in connection with infantile tuberculosis, leave no room for doubt that infected milk has been the cause in a large number of cases. It is also thought that a number of cases of the disease in adult persons could be reasonably ascribed to infantile infection, the disease having remained latent for a period of years. If tuberculosis was an actively progressive disease exhibiting marked symptoms, it would no doubt receive prompt attention and vigorous measures would be applied for its control and eradication from every herd. Its insidious nature is one of the features which render it difficult to combat. It attacks its victim without any manifestation of its presence until serious damage has been done.

The most effective means, thus far discovered, for controlling this disease is the periodical application of the tuberculin test. This test, while not infallible, is remarkably accurate and has been universally adopted for the detection of tuberculosis in cattle. It is the most valuable diagnostic agent thus far discovered and its value has been increasingly established with its extended use. Tuberculin in the form used for the subcutaneous method of testing, is a concentrated liquid which contains the toxic products of the tubercle bacilli, but not the bacilli themselves. The bacilli are planted in a specially prepared culture medium and allowed to develop until the medium becomes impregnated with the products developed by the activities of the germs. This medium is then sterilized at a temperature above the boiling point of water in order to kill the germs, which are then filtered out. The resulting product, being absolutely sterile, cannot produce the disease, nor will it cause any derangement or show any ill effects when injected into a healthy animal in normal condition. However, if the injected animal is tuberculous, a decided rise of temperature will follow within a short time after the injection of the tuberculin. The subcutaneous tuberculin test is applied by first determining the normal temperature of the animal to be tested. This requires the taking of at least two preinjection temperature measurements, at intervals of two to three hours.

The proper dose of tuberculin is injected under the skin with a sterile syringe, preferably between the hours of 8 to 10 P. M. The measurements of the post-injection temperatures should begin not later than eight hours after injection and continued at intervals of two hours until the 24th hour if the fullest information is desired. If the injected animal is free from tuberculosis, there will be no decided increase of temperature and no deviation from the usual appearance and actions. In the case of a tuberculous animal there will be a raise of temperature usually noted at from the 8th to 10th hour, and which reaches its greatest height at from the 14th to 18th hour. In the case of a typical reaction there will be an increase of two or more degrees up to a temperature of 104 degrees and above, in some instances the temperature may read as high as 107 degrees. The amount of increase or the height of temperature is no indication of the extent to which the animal may be affected. Occasionally an animal will give what has been termed a "suspicious reaction," that is, the increase will be less than two degrees and the temperature under 104. In such cases it is not advisable to positively condemn the animal unless there are some physical indications of tuberculosis, but it should be held for a retest at from 6 to 8 weeks from the date of the indefinite test. Notwithstanding the proven efficacy of the tuberculin test, it has been subjected to unfavorable criticism, chiefly because applied by incompetent or careless operators and under unfavorable conditions. Its use has become so general that many persons have empolyed it without a careful study of the physical phenomena which cause the reaction to the tuberculin. Consequently they are not prepared to avoid extraneous conditions which may interfere with accuracy, nor can they attribute the proper causes for apparent but not real failures. Tuberculin is a delicate diagnostic agent which brings about the reaction by acting upon the heat centers of the nervous system through the medium of the tuberculous material which is present in the body of a tuberculous animal. These heat centers may be influenced by other factors, and all such causes, so far as known, should be avoided when applying the test. From careful study of many thousands of tests by various investigators, it has been determined that the test when properly applied is accurate to an extent of 98 per cent. The two per cent. of apparent failures may be attributed to various causes which cannot always be definitely determined. Among these we may mention:

1. An impotent preparation of tuberculin.
2. When the tuberculin is applied during the incubative period of the disease.
3. When applied to an animal in which the tuberculosis lesions may be temporarily arrested, healed or encapsulated.

The causes for apparent failures may be divided into two classes, which we may designate as positive and negative. A failure in the positive class is one in which the animal is judged to have given a positive reaction but no lesions found upon post mortem examination. It should be remembered that the usual post mortem examination of cattle is macroscopical and not microscopical. It is not made primarily to determine whether or not the animal was tuberculous; but to determine the availability of the meat for food. If the lesions of tuberculosis are microscopical in size or located in the meninges, bone marrow, intramuscular spaces or other places which are inaccessible for gross autopsy, they will not be found and an apparent failure will be scored against the test. Other apparent failures of this class may have been caused by the application of the test when the animal was not in proper physical condition to receive it. An animal should not be tested during periods of sexual excitement; when in advanced pregnancy; shortly after parturition; when in a feverish condition; or when any physical cause or condition of environment would tend to irregularities of temperature.

A negative failure is one in which a tuberculous animal is judged to have passed a successful test. Failures of this nature are not discovered unless the animal is retested or slaughtered within a short time. They may be attributed to any of the four causes previously mentioned, but in many instances of this nature which we have investigated, it was found that faulty technique or carelessness in application was probably the real cause. In other instances there were reasons to suspect intentional tampering to defeat the object of the test. After all, we must concede that there are a few cases of apparent failures which cannot be satisfactorily explained, but when we consider the remarkable accuracy and good results attained it is evident that the tuberculin test is a most valuable agent in controlling and eradicating bovine tuberculosis.

The ocular and intradermal methods of applying the tuberculin test have not as yet come into general use, but are largely used to corroborate the results of the subcutaneous method, especially in cases of doubtful reactions.

For a number of years it has been customary for the State Livestock Sanitary Board to extend financial assistance to owners of cattle which have reacted to the tuberculin test. The funds appropriated for this purpose have never been equal to the demand. About July 1st, 1914, the available fund had been depleted to such an extent that it was necessary to place restrictions upon the payment of indemnity. Early in November the outbreak of foot-and-mouth disease brought the work of tuberculin testing to a close and it was not resumed until June, 1915. For these reasons the number of cattle tested, both native and interstate, was somewhat less than the preceding years. The following tables comprise a summary of the two years' work:

TUBERCULOSIS

January 1, 1914, to December 31, 1914

Counties	No. Herds Tested		No. Cattle Tested		Total number herds tested	Total number cattle tested	Number herds examined physically	Number cattle examined physically	Number cattle tested and examined	Number condemned on tuberculin test	Number condemned on physical examination	Total number condemned	Percentage based on number tested and examined
	S.	O.	S.	O.									
Adams,	....	7	....	93	7	93	4	4	97	13	3	16	16.49—
Allegheny,	....	27	....	422	27	422	2	21	443	56	2	58	13.09—
Armstrong,	....	2	....	46	2	46	1	1	46	....	....	....	....
Beaver,	....	8	....	93	8	93	1	1	94	24	1	25	26.59—
Bedford,	....	1	....	15	1	15	5	5	20	....	4	4	20.
Berks,	....	8	....	81	8	81	5	16	97	4	4	8	8.02—
Blair,	....	6	....	12	6	12	....	....	12	6	....	6	50.
Bradford,	....	108	....	1,333	108	1,333	2	2	1,335	39	1	40	2.99—
Bucks,	....	87	....	1,046	87	1,046	....	....	1,046	40	....	40	3.82—
Butler,	....	14	....	126	14	126	1	1	127	1	1	2	1.57—
Cambria,	....	9	....	81	9	81	....	....	81	3	....	3	3.70—
Carbon,	....	1	....	1	1	1	....	....	1	....	....	....	....
Centre,	....	11	....	330	11	330	....	....	330	9	....	9	2.72—
Chester,	....	154	....	2,650	154	2,650	4	4	2,654	259	4	263	9.91—
Clarion,	....	6	....	32	6	32	....	....	32	1	....	1	3.12—
Clinton,	....	3	....	32	3	32	....	....	32	2	....	2	6.25
Clearfield,	....	3	....	41	3	41	1	1	42	19	....	19	45.23—
Columbia,	....	8	....	86	8	86	1	1	87	6	....	6	6.89—
Crawford,	....	34	....	418	34	418	4	31	449	32	2	34	7.57—
Cumberland,	....	7	....	97	7	97	1	1	98	....	1	1	1.02—
Dauphin,	....	4	....	28	4	28	1	1	29	5	....	5	17.24—
Delaware,	....	46	....	463	46	463	1	4	467	63	1	64	13.70—
Elk,	....	2	....	2	2	2	....	....	2	....	....	....	....
Erie,	....	36	....	335	36	335	....	....	335	47	....	47	14.03
Fayette,	....	4	....	43	4	43	2	2	45	....	1	1	2.22—
Franklin,	1	28	1	189	29	190	3	9	199	7	3	10	[illegible]
Greene,	....	4	....	48	4	48	....	....	48	3	....	3	6.25
Huntingdon,	....	....	....	....	....	....	....	....	....	....	....	....	....
Indiana,	....	5	....	83	5	83	3	3	86	1	2	3	3.49—
Jefferson,	....	3	....	18	3	18	1	1	19	....	1	1	5.26—
Juniata,	....	1	....	11	1	11	....	....	11	....	....	....	....

TUBERCULOSIS—Continued.

Counties	No. Herds Tested		No. Cattle Tested		Total number herds tested	Total number cattle tested	Number herds examined physically	Number cattle examined physically	Number cattle tested and examined	Number condemned on tuberculin test	Number condemned on physical examination	Total number condemned	Percentage based on number tested and examined
	S.	O.	S.	O.									
Lackawanna,	....	14	....	310	14	310	....	....	310	70	....	70	22.58—
Lancaster,	....	41	....	380	41	380	12	13	393	14	11	25	6.36—
Lawrence,	....	8	....	81	8	81	....	....	81	1	....	1	1.23—
Lebanon,	....	12	....	315	12	315	3	3	318	6	6	9	2.83—
Lehigh,	....	21	....	338	1	338	2	2	340	4	2	6	1.76—
Luzerne,	....	17	....	115	17	115	....	....	115	....	....	....	....
Lycoming,	....	5	....	64	5	64	....	....	64	2	....	2	3.12—
McKean,	....	4	....	30	4	30	....	....	30	4	....	4	13.33—
Mercer,	1	13	24	121	14	145	....	....	145	3	....	3	2.06—
Mifflin,	....	2	....	20	2	20	1	37	57	....	....	....	....
Monroe,	....	5	....	43	5	43	....	....	43	1	....	1	2.32—
Montour,	....	1	....	5	1	5	....	....	5	....	....	....	....
Montgomery,	1	103	183	1,343	104	1,526	1	1	1,527	146	1	147	9.62—
Northampton,	....	32	....	88	32	88	....	....	88	14	....	14	15.90—
Northumberland,	....	4	....	10	4	10	2	2	12	....	....	....	....
Perry,	....	....	....	....	....	....	1	1	1	....	....	....	....
Philadelphia,	....	83	....	751	83	751	1	1	752	79	1	80	10.63—
Potter,	....	5	....	19	5	19	....	1	19	3	....	3	15.78—
Schuylkill,	1	5	1	36	6	37	....	....	37	4	....	4	10.81—
Snyder,	....	3	....	53	3	53	1	1	54	....	1	1	1.85—
Somerset,	....	3	....	49	3	49	1	1	50	....	....	....	....
Sullivan,	....	....	....	....	....	....	....	....	....	....	....	....	....
Susquehanna,	1	64	6	1,543	7	1,549	2	9	1,558	48	3	51	3.27—
Tioga,	....	15	....	301	15	301	....	....	301	27	....	27	8.97—
Union,	....	....	....	....	....	....	1	1	1	....	1	1	100.
Venango,	....	6	....	48	6	48	....	....	48	1	....	1	2.08—
Warren,	1	5	175	15	6	190	....	....	190	2	....	2	1.05—
Washington,	1	22	79	142	23	221	2	2	223	29	1	30	13.45—
Wayne,	....	17	....	282	17	282	....	....	282	1	....	1	.35—
Westmoreland,	....	24	....	197	24	197	....	....	197	13	....	13	6.59—
Wyoming,	....	9	....	90	9	90	....	....	90	11	2	13	14.44—
York,	....	55	....	388	55	388	3	3	391	54	3	57	14.57—
Total,	7	1,245	469	15,432	1,252	15,901	76	186	16,087	1,077	62	1,140	7.08

TUBERCULOSIS

January 1, 1915, to December 31, 1915

Counties	No. Herds Tested		No. Cattle Tested		Total number herds tested	Total number cattle tested	Number herds examined physically	Number cattle examined physically	Number cattle tested and examined	Number condemned on tuberculin test	Number condemned on physical examination	Total number condemned	Percentage based on number tested and examined
	S.	O.	S.	O.									
Adams,	....	5	....	40	5	40	1	1	41	....	....	....	....
Allegheny,	....	35	....	519	35	519	3	3	522	52	1	53	10.15+
Armstrong,	....	1	....	2	1	2	1	8	10	....	1	1	10.
Beaver,	....	4	....	14	4	14	3	3	17	1	2	3	17.64+
Bedford,	....	....	....	....	....	....	....	....	....	....	....	....	....
Berks,	....	7	....	112	7	112	....	....	112	3	....	3	2.67+
Blair,	....	1	....	2	1	2	....	....	2	....	....	....	....
Bradford,	....	74	....	834	74	834	....	....	834	3	....	3	.35+
Bucks,	....	53	....	870	53	870	3	3	873	40	4	44	5.04+
Butler,	....	6	....	75	6	75	....	....	75	3	....	3	4.
Cambria,	....	6	....	67	6	67	....	....	67	1	....	1	1.49+
Carbon,	....	1	....	10	1	10	....	....	10	....	....	....	....
Centre,	....	5	....	181	5	181	1	1	182	20	....	20	10.98+
Chester,	....	145	....	2,931	145	2,931	2	2	2,933	302	2	304	10.36+
Clarion,	....	....	....	....	....	....	....	....	....	....	....	....	....
Clinton,	....	2	....	11	2	11	....	....	11	1	....	1	9.09+
Clearfield,	....	4	....	10	4	10	....	....	10	....	....	....	....
Columbia,	....	7	....	53	7	53	1	1	54	4	....	4	7.40+
Crawford,	....	13	....	110	13	110	2	8	118	3	1	4	3.38+
Cumberland,	....	2	....	16	2	16	1	7	23	....	....	....	....
Dauphin,	....	5	....	124	5	124	....	....	124	15	....	15	12.09+
Delaware,	....	39	....	370	39	370	....	....	370	113	....	113	30.54+
Elk,	....	....	....	....	....	....	....	....	....	....	....	....	....
Erie,	....	21	....	216	21	216	....	....	216	27	....	27	12.5
Fayette,	....	2	....	29	2	29	....	....	29	13	....	13	44.82+
Franklin,	....	9	....	21	9	21	1	1	22	10	1	11	50.
Greene,	....	1	....	4	1	4	....	....	4	....	....	....	....
Huntingdon,	....	....	....	....	....	....	....	....	....	....	....	....	....
Indiana,	....	4	....	18	4	18	....	....	18	....	....	....	....
Jefferson,	....	2	....	6	2	6	....	....	6	....	....	....	....
Juniata,	....	....	....	....	....	....	....	....	....	....	....	....	....
Lackawanna,	....	16	....	224	16	224	....	....	224	14	....	14	6.24+

TUBERCULOSIS—Continued.

Counties	No. Herds Tested		No. Cattle Tested		Total number herds tested	Total number cattle tested	Number herds examined physically	Number cattle examined physically	Number cattle tested and examined	Number condemned on tuberculin test	Number condemned on physical examination	Total number condemned	Percentage based on number tested and examined
	S.	O.	S.	O.									
Lancaster,	....	27	....	192	27	192	1	1	193	21	1	22	11.39+
Lawrence,	....	11	....	169	11	169	....	....	169	27	....	27	15.97+
Lebanon,	....	10	....	205	10	205	1	1	206	21	1	22	10.67+
Lehigh,	....	12	....	103	12	103	....	....	103	6	....	6	5.82+
Luzerne,	....	8	....	86	8	86	1	1	87	2	1	3	3.48+
Lycoming,	....	12	....	72	12	72	....	....	72	2	....	2	2.77+
McKean,	....	1	....	2	1	2	....	....	2	....	....	....	....
Mercer,	....	9	....	90	9	90	....	....	90	....	....	....	....
Mifflin,	....	1	....	2	1	2	....	....	2	....	....	....	....
Monroe,	....	2	....	12	2	12	....	....	12	....	....	....	....
Montour,	....	4	....	42	4	42	1	1	43	2	....	2	4.65+
Montgomery,	1	96	173	1,650	97	1,823	2	2	1,825	67	2	69	3.78+
Northampton,	....	19	....	116	19	116	1	1	117	1	1	2	1.70+
Northumberland,	....	2	....	15	2	15	....	....	15	3	....	3	20.
Perry,	....	1	....	5	1	5	....	....	5	....	....	....	....
Philadelphia,	1	47	115	482	48	597	....	....	597	16	....	16	2.68+
Potter,	....	1	....	1	1	1	....	....	1	....	....	....	....
Schuylkill,	....	1	....	2	1	2	....	....	2	....	....	....	....
Snyder,	....	1	....	32	1	32	....	....	32	....	....	....	....
Somerset,	....	2	....	2	2	2	1	1	3	....	1	1	33.33⅓
Sullivan,	....	....	....	....	....	....	....	....	....	....	....	....	....
Susquehanna,	....	46	....	1,294	46	1,294	....	....	1,294	37	....	37	2.85+
Tioga,	....	16	....	297	16	297	2	2	299	4	2	6	2.00+
Union,	....	2	....	35	2	35	....	....	35	8	....	8	22.85+
Venango,	....	3	....	30	3	30	....	....	30	....	....	....	....
Warren,	....	8	....	334	8	334	....	....	334	8	....	8	2.39+
Washington,	....	25	....	159	25	159	1	1	160	5	1	6	3.75
Wayne,	....	20	....	219	20	319	....	....	319	2	....	2	.62+
Westmoreland,	....	8	....	108	8	108	....	....	108	8	....	8	7.40+
Wyoming,	....	3	....	27	3	27	....	....	27	....	....	....	....
York,	....	10	....	77	10	77	....	....	77	14	....	14	18.18+
Total,	2	878	288	12,829	880	13,117	30	49	13,166	879	22	901	6.82

Year.	No. herds tested	No. cattle tested	No. reactors	No herds free	% of reactors.
1896,	432	5,430	1,191	187	21.9 +
1897,	626	7,613	1,099	298	14.4 +
1898,	582	6,516	1,062	220	17.8 +
1899,	129	6,443	1,107	158	17.1 +
1900,	651	8,473	1,314	254	15.5 +
1901,	545	8,662	1,203	235	13.8 +
1902,	375	6,066	1,024	142	16.8 +
1903,	337	5,573	1,060	132	19.02+
1904,	322	5,159	891	114	17.04+
1905,	529	7,774	1,179	290	15.1 +
1906,	733	7,079	981	262	13.8 +
1907,	402	7,153	950	177	13.2 +
1908,	501	7,083	1,037	264	14.6 +
1909,	1,085	13,288	1,810	617	13.6 +
1911,	1,109	13,403	1,334	685	9.95+
1912,	1,534	20,534	2,424	898	11.31+
1913,	1,308	17,101	1,346	931	7.87+
1914,	1,252	15,901	1,077	900	6.77+
1915,	880	13,117	879	....	5.46+
Total for 20 years,	14,363	192,310	24,408	7,174	
Average per year,	718+	9,615+	1,220+	377+	

CATTLE IMPORTED INTO PENNSYLVANIA

From January 1, 1914 to December 31, 1914

	Examined and tested with tuberculin	Condemned	Disposition
Cattle tested before shipment,	10,557	163	Not shipped.
Cattle tested at Lancaster,	12,552	76	Slaughtered.
Cattle tested at Pittsburgh,	5,974	89	Slaughtered.
Cattle tested at other points in Pennsylvania,	3,561	37	Slaughtered.
Total,	32,644	365	

CATTLE IMPORTED INTO PENNSYLVANIA

From January 1, 1915, to December 31, 1915

	Examined and tested with tuberculin	Condemned	Held for retest	Passed on retest	Reactors killed	Autopsy Findings		Carcasses Inspected	
						Positive	Negative	Passed	Condemned
Tested before shipment, ...	10,891	107	....	....	....	....	....	....	....
Tested at Lancaster, ...	7,037	73	226	178	73	47	26	61	12
Tested at Pittsburgh, ...	1,106	5	18	16	5	2	2	5	....
Tested at other points in Pennsylvania, ...	1,177	10	6	6	10	9	2	5	5
Totals, ...	20,211	195	250	200	88	58	30	71	17

About two-thirds of the cattle were tested at the stockyards and other places in Pennsylvania by agents of the State Livestock Sanitary Board. The remainder were tested before shipment by approved agents of other states or the United States Bureau of Animal Industry.

RECORD OF TUBERCULIN TESTS ON INTERSTATE CATTLE

	Cattle shipped on permit	Condemned	Cattle shipped without permit	Condemned	Cattle tested before shipment	Condemned
1898, ...	10,374	37	3,468	19	736	7—not shipped
1899, ...	10,034	32	3,522	38	1,044	
1900, ...	12,356	59	3,652	61	1,827	
1901, ...	13,110	80	4,252	67	1,454	
1902, ...	14,967	74	4,287	91	1,561	3—not shipped
1903, ...	13,069	14	3,736	73	1,469	
1904, ...	14,178	14	4,921	89	1,961	15—not shipped
1905, ...	21,922	69	5,493	108	2,427	27—not shipped
1906, ...	17,366	55	8,212	67	2,734	29—not shipped
1907, ...	17,048	142	835	18	2,221	25—not shipped
1908, ...	12,709	75	4,638	115	910	22—not shipped
1909, ...	14,584	33	8,953	112	1,363	14—not shipped
1910, ...	14,248	109	4,161	61	1,219	9—not shipped
1911, ...	15,392	108	6,277	113	2,213	109—not shipped
1912, ...	14,438	82	3,462	102	2,878	80—not shipped
1913, ...	....	....	27,708	260	11,543	187—not shipped
1914, ...	....	....	22,087	202	10,557	163—not shipped
Totals, 17, ...	215,795	983	119,664	1,596	48,117	690

AUTOPSIES ON CONDEMNED NATIVE CATTLE, 1915

Reacting Cattle	Autopsies		Reactors not posted	Condemned by physical examination	Autopsies		Physical condition not posted	Carcasses	
	Positive	Negative			Positive	Negative		Passed	Condemned
879,	678	23	178	22	22	0	0	564	173

Note:—Fourteen (14) cattle killed by owner or died on premises.

LOCATIONS OF LESIONS

955 Autopsies

Glands			Lungs	Pleura	Glands.		Liver	Spleen
Cervical	Bronchial	Mediastinal			Portal	Mesenteric		
197	604	668	517	154	135	281	22	22

PROSECUTIONS

County	Act of	Section	Result
Chester,	July 22, 1913	10	Guilty
Chester,	July 22, 1913	10	Guilty
Chester,	July 22, 1913	10	Guilty
Franklin,	July 22, 1913	10	Guilty
Mercer,	July 22, 1913	10	Guilty
Mercer,	May 26, 1897	37	Guilty
Susquehanna,	May 26, 1897	37	Guilty
Lancaster,	Federal, ...	....	Guilty

MISCELLANEOUS DISEASES

Under miscellaneous diseases the Board is called upon for assistance in handling many transmissible diseases not included among those reportable. We have 322 files filled with correspondence in reference to this class of diseases. While the Board is not charged especially with their control, it has authority to adopt whatever measures appear necessary to prevent or control all diseases of livestock, including poultry. In some cases the losses from non reportable diseases are of as much or more economic value to our livestock interests as the diseases mentioned in previous part of the report. This is especially true of abortion. This disease is widely spread all over the country and the call for assistance from herd owners is increasing from year to year.

ABORTION

The disease is principally confined to cattle, yet in certain parts of the State it causes considerable losses in horse breeding sections. Abortion of one species of animals is not transmissible under natural conditions to other species. In cattle it is produced by the bacillus of Bang. In mares by other forms of infection. Abortion may exist in more than one species of animals at the same time on the same farm even though the causes are different. Abortion in cattle is by far the most important in our domestic animals. It is doubted if any disease in animals in Pennsylvania is of more importance at the present time.

The bacillus of Bang is found readily in the stomach of the foetus, the foetal envelopes and the vaginal discharge. It is also found in the milk of an infected cow. It is spread principally by the vaginal discharge, the foetus, the foetal envelope and milk. It is most often carried into the system of a susceptible animal by the digestive tract. Some believe that the organism will not live long in the body of a non-pregnant animal.

Up to recently it has been difficult to make a true diagnosis for the reason that there were but few external symptoms of the disease and these were not manifest till a short time before abortion. Since the organism was discovered and it is known where and how to find it there is but little difficulty in establishing the fact of a positive diagnosis. In addition to this it has been proven that a diagnosis can be made on an infected cow by a physical examination, the agglutination test or the complement fixation test or a combinnation of the three. During the year 326 blood samples were examined at the laboratory for this purpose. These tests are of some practical importance where it is desired to know which animals are infected.

There has been nothing new discovered during the year in the line of treatment. The Board conducted quite an extensive experiment with the medicated methylene blue treatment and has concluded that it with the carbolic acid treatment is of no value.

We have had several successful demonstrations of the value of local antiseptic treatment. There is no doubt but what the disease can be controlled in this way if the plan is carefully and faithfully followed. It will not work, however, if the responsibility is passed on to the average laborer employed in other work about the herd. It must be carried out by an intelligent, faithful, trusty man, with special training and knowledge in this line of work. It is hoped that some more simple form of treatment may be discovered in the future. At the present time there is nothing of practical importance to recommend to owners of native infected stock. In valuable breeding herds it may be advisable to undertake treatment.

SPOROTRICHOSIS

Sporotrichosis or what was formerly diagnosed as epizootic lymphangitis in horses is of rather rare occurrence at the present time. Of four suspected specimens sent to the laboratory for diagnosis during the year three proved to be positive. No quarantines were placed during the year on account of this disease. It has been learned that the disease does not spread from animal to animal but from wound infection in much the same way as actinomycosis is carried. The disease responds readily to the prescribed form of treatment if begun early in the course of the disease. If begun late there is but little hope of a cure.

FORAGE POISONING

Forage poisoning, so-called cerebro spinal meningitis, or the Kansas horse sickness, has occurred in isolated cases in various parts of the State. The true cause of the disease is still a mystery. It is supposed to be due to a mould or fungus growth that is most likely to develop on forage. The first symptom usually observed is an inability to swallow. The animal appears thirsty and tries to drink but cannot swallow. The patient becomes paralyzed in a few hours and is unable to get up or stand if placed on its feet. Death is pretty sure to follow in from one to three days.

There is no specific cure for the disease. When it occurs in a stable the well horses should be removed to another stable at once and the food and water changed. In some cases it appears that it may have been caused by drinking water that had a large amount of decomposed organic matter in it. One should also avoid feeding food during the heating process or that which contains mold. Ensilage or cut corn stalks are especially dangerous for horses. Other species of animals are seldom afflicted with this disease. Feed that will cause the disease in horses may usually be fed to cattle with impunity. Owners and veterinarians are requested to report all cases of this disease promptly to the Board and all assistance possible will be cheerfully given.

JOHNES DISEASE

Bacterial dysentery, or Johnes disease, is found in cattle occasionally. It is most common in imported channel island cattle. It is characterized by a persistent and uncontrollable diarrhoea. It is a chronic disease. An animal may recover from a few attacks but eventually it succumbs. The disease should be suspected where a mature bovine animal develops a persistent diarrhoea and loses flesh rapidly during the attack. It may recover after considerable emaciation has occurred but each subsequent attack becomse worse. The disease is not wide spread in the State but there is no cure for it at the present time and when a positive diagnosis has been made it is best to destroy the animal and disinfect the place occupied by her before other cattle are allowed where she has been.

The following table shows some of the other miscellaneous diseases of animals investigated by the Board:

MISCELLANEOUS DISEASES INVESTIGATED BY LABORATORY DURING 1914

	Cow	Horse	Dog	Hog	Cat	Calf	Turtle	Mouse	Rabbit
Pneumonia,	1	1	......	1	......	1	......	......	......
Strep. & Staph infection,	5	12	......	......	......	......	......	......	......
Trichophytosis,	......	......	......	......	......	3	......	......	......
Toxemia,	......	......	......	1	......	......	......	......	......
Enteritis,	......	......	1	2	1	......	1	......	......
Supurative Alv. periostitis,	......	......	......	1	......	......	......	......	......
Exanthema,	......	......	......	1	......	......	......	......	......
Cirrhosis of liver,	1	......	......	......	......	......	......	......	......
Favus,	......	......	......	......	......	......	......	1	......
Apostamatous splenitis,	1	......	......	......	......	......	......	......	......
Multiple hematoma,	......	......	1	......	......	......	......	......	......
Occlusion of large intestines,	......	......	......	......	......	......	......	......	1
Suffocation,	......	......	......	1	......	......	......	......	......
Congestion of lungs,	......	......	......	1	......	......	......	......	......
Hydrocephalus,	......	......	......	......	......	2	......	......	......
Distemper,	......	......	1	......	......	......	......	......	......
Infectious abortion of mares,	......	1	......	......	......	......	......	......	......
Coli bacillosis,	......	......	......	......	......	6	......	......	......
Pyometritis,	......	......	......	......	......	......	......	......	1
Dog typhoid,	......	......	1	......	......	......	......	......	......
Traumatic pericarditis,	1	......	......	......	......	......	......	......	......
Cystic kidney,	......	......	1	......	......	......	......	......	......
Strangles,	......	1	......	......	......	......	......	......	......
Susp. actinomycosis,	1	......	......	......	......	......	......	......	......
Total,	10	15	4	9	1	12	1	1	2

MISCELLANEOUS DISEASES INVESTIGATED BY LABORATORY DURING 1915

	Horses	Cattle	Sheep	Swine	Goat	Calf	Dog	Cat	Monkey	Rabbit	G-pig	Rat	Deer	Man
Enteritis,	....	....	....	2	....	....	....	....	....	....	10	....	....	....
Gastro-enteritis,	....	....	....	....	....	....	....	....	....	1	1	....	....	....
Mycotic enteritis,	....	....	....	....	....	....	1	....	....	....	....	....	....	....
Catarrhal enteritis,	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Metastatic abscesses,	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Encapsulated abscesses,	....	....	....	1	....	....	....	....	....	....	....	....	....	....
Cystitis,	....	....	....	....	....	....	....	....	....	1	1	....	....	....
Suspected calf cholera,	....	....	....	....	1	....	....	....	....	....	....	....	....	....
Coli bacillosis,	....	....	....	....	....	....	....	1	....	....	....	....	....	....
Cystic ovaries,	....	4	....	....	....	....	....	....	....	....	....	....	....	....
Ectopia viscerum,	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Fat necrosis,	....	4	....	....	....	....	....	....	....	....	....	....	....	....
Suspected aphthous fever,	....	5	....	1	....	....	....	....	....	....	....	....	....	....
Suspected glandered tissue,	9	....	....	....	....	....	....	....	....	....	....	....	....	....
Amorphus,	....	1	....	....	....	....	....	....	....	....	....	....	....	....
Probable hemorrhagic septicemia,	....	5	....	....	....	....	....	....	....	....	....	....	....	....
Parasitic infection (not determined),	....	....	7	....	....	....	....	....	....	....	....	....	....	....
Bac. necrophorus,	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Intoxication,	....	....	....	....	....	....	1	....	....	....	....	....	....	....
Streptococcic infection,	....	....	....	....	....	....	....	1	....	1	....	....	....	....
Para phlegia,	....	....	....	....	....	....	....	....	....	1	....	....	....	....
Peritonitis,	....	....	....	....	....	....	....	....	....	....	2	....	....	....
Septicemia,	....	....	....	....	....	....	....	....	....	....	3	....	....	....
Mammitis,	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Suffocation,	....	....	....	....	....	....	....	....	....	....	1	....	....	....
Suspected infectious abortion,	....	....	7	....	....	1	....	....	....	....	....	....	....	....
Bacteriolgical examination negative to abortion,	....	1	4	....	....	....	....	....	....	....	....	....	....	....
Probable food poisoning,	....	1	1	1	....	....	....	....	....	....	1	....	....	....

MISCELLANEOUS DISEASES INVESTIGATED BY LABORATORY DURING 1915.—Continued.

	Horses	Cattle	Sheep	Swine	Goat	Calf	Dog	Cat	Monkey	Rabbit	G-pig	Rat	Deer	Man
Negative to bacterial dysentery,	....	2	....	....	....	....	....	....	....	....	....	....	....	....
Negative to actinomycosis,	....	4	....	....	....	....	....	....	....	....	....	....	....	....
Negative to sporotrichosis,	3	....	....	....	....	....	....	....	....	....	....	....	....	....
Negative to contagious pleuro-pneumonia,	....	2	....	....	....	....	....	....	....	....	....	....	....	....
Streptococcic mastitis,	....	6	....	....	....	....	....	....	....	....	....	....	....	....
Multi-bacterial infection,	4	4	....	....	....	....	....	....	....	....	....	....	....	....
Pneumonia,	....	....	....	....	....	1	1	....	....	....	2	....	....	....
Fibrinous pneumonia,	....	1	....	....	....	....	....	....	....	....	3	....	....	....
Suspected poison (discarded). (No chemical analyses),	3	1	....	....	....	....	1	2	....	....	....	....	....	....
Urine analyses,	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Rachitis,	....	....	....	....	....	....	....	....	1	....	....	....	....	....
Bacteriological examination negative,	1	3	....	....	....	2	....	1	....	....	2	....	....	....
Vaccine made,	6	1	....	....	....	....	....	....	....	....	....	....	....	1
Experimental,	3	....	....	....	....	....	....	....	....	....	....	....	....	....
No good for examination	1	1	....	2	....	4	....	....	....	....	....	....	1	....
Decomposed and discarded,	1	10	2	3	....	....	11	....	....	....	3	2	....	....

NUMBER OF SPECIMENS EXAMINED AT LABORATORY, 1915.

	Horses	Cattle	Dogs	Cats	Swine	Sheep	Goat	Deer	Monkey	Rabbits	G-pigs	Chickens	Quail	Duck	Pheasant	Turkey	Pigeon	Man	Totals
January,	160	25	21	......	9	......	......	......	......	1	3	1	21	......	......	......	......	......	244
February,	76	140	22	2	3	10	......	......	......	......	......	3	2	......	......	......	......	......	258
March,	402	110	26	3	8	4	......	......	......	......	3	7	5	......	......	......	......	1	626
April,	80	18	20	1	2	2	......	......	......	1	3	1	......	10	......	......	......	......	138
May,	669	43	26	1	4	1	3	......	......	1	2	1	......	10	......	......	......	......	761
June,	363	13	28	1	3	1	......	......	1	......	......	2	......	......	1	......	......	......	413
July,	43	4	38	5	7	1	......	......	......	......	1	6	......	......	......	......	......	1	106
August,	149	29	41	1	9	7	......	......	......	......	14	5	......	......	......	......	......	......	255
September,	57	11	21	......	5	5	2	......	......	......	2	1	......	5	......	......	......	......	109
October,	77	12	15	1	5	1	1	......	......	......	6	1	......	......	......	......	1	......	120
November,	376	112	11	1	7	......	......	......	......	......	4	1	......	......	......	2	......	......	454
December,	84	11	18	1	8	......	......	1	......	......	......	1	21	......	......	1	......	......	146
Total,	2,536	528	287	17	70	32	6	1	1	3	38	30	49	25	1	3	1	2	3,630

BIOLOGICAL PRODUCTS SENT OUT DURING 1915

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total Doses
Tuberculin (0.4%),	465	869	522	2,560	1,662	2,979	3,553	5,788	6,687	5,477	5,977	2,677	39,216
Tuberculin retest and special retest,	149	150	27	47	130	183	689	526	496	389	21	311	3,118
Tuberculin (ophthalmic),	1	135	1	....	35	....	2	36	4	55	35	54	358
Tuberculin (intra dermal),	....	1	1	85	....	100	....	420	201	145	10	125	1,091
Mallein (ophthalmic),	128	118	596	192	1,116	696	672	389	184	1,105	799	579	6,574
Mallein (0.5),	3	41	4	19	103	....	....	....	3	....	....	1	174
Anti hog cholera serum,	65,180	23,120	29,930	36,550	60,490	97,380	72,310	66,450	101,950	103,790	73,035	69,900	800,085 cc
Anthrax vaccine (No. 1 & 2),	....	....	....	1,250	....	170	21	70	95	....	15	15	1,636

MISCELLANEOUS PRODUCTS EXAMINED BY LABORATORY, 1915

	Meat	Hay	Water	Corn	Gluten	Muscle	Pus	Organ specimens
Palatability,	1							
Museum,						1		2
Neg. to meat poison,	1							
Vegetable matter,			3					
Several organisms,			2					
Feed exam. negative,				1				
Some lead particles,					1			
Tannic acid,			1					
Gas prod. organism,							1	
Wire trauma,								1
Inoc. negative,					1			
No good for exam.,				1				
Exam. negative,		1	2					

PARASITIC DISEASES

The parasitic diseases of animals should receive more attention than they have in the past. It is strange that owners seldom give any attention to internal parasites except worms and bots in horses and these are of practically no importance. Much more trouble is caused in horses by the various worm and bot remedies than by the parasites themselves.

Lung worms in calves and lung worms and stomach worms in sheep are important. Young animals are often killed by these paracites and if proper measures are not adopted a large part of the calf and lamb crop will be lost. In calves these parasites live in the wind pipe and its branches and they cause a form of bronchitis or what is sometimes called hoose. It is most liable to occur in the late fall and the owner frequently reports that his calves were left out in bad weather and caught cold. They cough and have a mucous frothy discharge from the nose, lose flesh rapidly and may die in the course of a few days.

In lambs somewhat similar symptoms may be observed from lung worms, yet they are more liable to be affected with the stomach worm or both varieties. If so they become unthrifty, poor in flesh, pot bellied, mucous membranes are pale and bloodless, the bowels are loose and death is quite sure to follow.

These parasites are about the diameter of a human hair and less than an inch in length. They can be seen easily with the naked eye in the mucous in the lung or mixed in with the contents of the stomach. They are more likely to be propagated and spread on wet pastures and they will remain alive from year to year on the same premises unless measures are adopted to destroy them.

The following table shows some of the parasitic diseases, their hosts, etc., found in specimens sent to the laboratory:

PARASITIC DISEASES INVESTIGATED DURING 1914

Material	Parasite	Diagnosis	Horse	Mule	Cow	Sheep	Hog	Dog	Skunk	Fowl	Human
Carcass,	Taenia & ascaris,	Verminous gastro-enteritis,	......	......	......	......	......	......	1	......	......
Intestines,	Oesophagpstoma Colombiannum,	Nodular disease,	......	......	......	2	......	......	......	......	......
*Skin scrapings,	Neg.,	Negative to parasites,	7	1	......	......	1	......	......	......	......
From anal region,	Not determined,	Egg capsules,	......	......	......	......	......	2	......	......	......
From intestines,	Sclerastoma equinum,	Intestinal strongylosis,	1	......	......	......	......	......	......	......	......
Skin scrapings,	Sarcoptes scabeil-suis,	Scabies,	......	......	......	......	2	......	......	......	......
Carcass,	Strongylus paradoxus,	Verminous bronchitis & pneumonia,	......	......	......	......	1	......	......	......	......
Segments,	Taenia solium,	Taeniasis,	......	......	......	......	......	......	......	......	1
Lungs,	Strongylus micrurus,	Bronchial & pulmonary strongylosis,	......	......	1	......	......	......	......	......	......
Carcass,	Oesophagostoma dentatum,	Intestinal strongylosis,	......	......	......	......	1	......	......	......	......
Carcass,	Taenia,	Taeniasis,	......	......	......	......	......	2	......	......	......

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*Above you will note the number of cases negative to parasites of skin scrapings. This is undoubtedly due to the fact that most of the material submitted to be examined for scab acarina, consisted of hairs with a few adhering dried scabs and particles of exfoliated epithelium. Scab parasites are not likely to be found in such material.

PARASITIC DISEASES INVESTIGATED DURING 1915

Material	Parasites	Diagnosis	Horse	Ox	Sheep	Goat	Hog	Dog	Cat	Man
Skin scrapings,	Demodex folliculorum,	Follicular mange,						1		
Liver,	Echinococcus polymorphus,	Hydatid disease,					1			
Skin scrapings,	Negative,	Negative to parasites,	3							
Skin scrapings,	Trichophyton tonsurans,	Ringworm,		1						
Head,	Larvae oestrus ovis,	"Head maggot,"			2					
Flesh,	Cysticercus bovis,	Beef measles,		1						
Hair combings,	Hematopinus piliferous,	Phthiriasis,						1		
Skin scrapings,	Sarcoptes scabiei,	Mange,					1			
Skin scrapings,	Trichodectes caprae,	Phthiriasbis,				2				
Feces,	Haemonchus contortus,	Strongylosis,				1				
Wool,	Melophagus ovinus,	Sheep "tick,"			1					
Worms,	Oxyuris mastigoides,	Oxyuriasis,	2							
Skin scrapings,	Negative,	Negative to parasites,							1	
Worms,	Taenia crassicollis,	Taeniasis,							1	
Carcass,	Haemonchus contortus,	Strongylosis,			6					
Carcass,	Haemonchus contortus,	Strongylosis,				2				
Parasites,	Dermanyssus gallinae,	Ascariasis,					1			
Spider,	Heteropoda venatoria,									1
Ticks,	Margaropus annulatus,	Texas fever tick,		1						
Intestines,	Oesophagostoma columbianum,	Nodular disease,				2				
Hair combings,	Ctenocephalus felis,	Eggs and larvae,							1	
Worms,	Dipylidium caninum,	Taeniasis,						1		
Intestines,	Dochmiasis trigonocephalus,	Dochmasias,					1			
Carcass,	Ascaris marginata,	Helminthiasis,						3		
Skin scrapings,	Negative,	Negative to parasites,		1						
Segment,	Taenia,	Taeniasis,								1
Lungs,	Strongylus paradoxus,	Strongylosis,					1			

TUMORS

Animals are afflicted with tumors of various kinds about the same as are found in man. Some are malignant, others are harmless so far as the usefulness or life of the animal is concerned. It is not possible in most cases to make a positive diagnosis on the various kinds of tumors without laboratory assistance.

During the two years the following tumors were diagnosed at the laboratory:

Diagnosis Determined	Cat	Cow	Horse	Chicken	Rabbit	Hog	Dog
Lympho-sarcoma,	....	....	1	....	....	....	....
Rhadbomyoma,	1	....	....	....	....	....	....
Medulary carcinoma,	....	....	1	....	....	....	....
Carcinomatosis,	....	....	1	1	....	....	1
Soft fibroma,	....	1	....	....	1	....	....
Osteo-fibroma,	....	....	1	....	....	....	....
Adeno sarcoma,	....	....	....	....	....	1	....
Squamous epithelioma,	....	1	1	....	....	....	....
	1	2	5	1	1	1	1

MILK HYGIENE

The work of milk hygienve in Pennsylvania is divided into several phases and placed under the jurisdiction of different divisions of the Department of Agriculture.

The State Department of Health also enters into this work when milk may be suspected of having been the medium of infection in cases of diseases affecting human beings. That portion of the work relating to the chemical composition of milk, especially skimming and watering, comes under the jurisdiction of the State Dairy and Food Commissioner.

The handling and distribution of milk by retail dealers, comes under supervision of the local authorities of the municipality in which the milk may be sold and should be governed by local ordinance.

The work of the State Livestock Sanitary Board is directed to the diseases of cattle and sanitary conditions attendant upon milk production. We have endeavored to carry on this work along educational lines rather than by exercise of police authority. Our agents have been trained to assist dairymen and farmers in solving the problems which arise in connection with diseases and insanitary condition.

When a dairy animal may be suspected of being affected with a dangerous transmissible disease the case should be immediately reported either to our Board or our local agent for prompt investigation. In case of ailments of lesser importance the local veterinarian should first be consulted. Veterinarians understand that in cases of difficult diagnosis we are pleased to assist by personal service or the use of our laboratory facilities.

In matters pertaining to sanitation we are always pleased to render such assistance as may be within our jurisdiction. In some instances, dairy farmers who contemplate remodeling barns or constructing new buildings have requested advice in regard to the laws governing such buildings, location of milk houses, out houses, etc. We have been unable to comply with these requests for the reason that there are no laws applicable to these cases, but we have in some instances been able to render assistance by interviewing the owner and suggesting desirable sanitary features of construction.

The Board is empowered to act in co-operation with local boards of health for the protection of milk supplies, and much of our sanitary inspection work is conducted in this manner. We find this co-operative work brings good results; on the other hand, when local authorities are indifferent, it is hopeless to expect farmers to improve conditions. If the sale of impure milk from a dirty dairy farm is prohibited in one place the product will be diverted to another town where there is no ordinance. A model milk ordinance and copies of regulations (Circular No. 29) will be furnished.

Section 33 of the act of July 22, 1913, requires the operators of creameries and cheese factories to pasteurize skim milk and separator slops before returning or delivering same to their patrons or other persons. It is customary with many creameries to sell a portion of the skim milk to persons who intend using it for the manufacture of cottage cheese or for condensing purposes. In such cases the law does not require pasteurization; it is intended to cover skim milk and separator slops which are to be fed to calves and swine. The object of the law is to prevent the dissemination of transmissible diseases of animals, such as foot-and-mouth disease, contagious abortion, tuberculosis, anthrax, cow-pox, lump jaw, etc. The value of this law was forcibly demonstrated during the recent epizootic of foot-and-mouth disease. Several creameries, which were not strictly observing the law, caused such spread of the disease among the patrons that the creameries were forced to close.

It is to the advantage of creamerymen as well as livestock owners and others interested in the dairy industry, to co-operate in the enforcement of this law. Convictions have been obtained in several cases of violations and our agents are now visiting every creamery, cheese factory, receiving or skimming station in this State to see that this law is being properly observed. Circular No. 28 illustrates a simple and inexpensive method of pasteurization. Copies will be furnished to any one interested in this subject.

During 1914, 892 samples of milk were received in the Milk Hygiene Laboratory for examination. This is an increase over 1913 when 673 samples were received. 186 of the samples received in 1914 were sent in by agents of the Board who were making investigations of milk supplies at the request of local Boards of Health. 569 samples were received from local dairy inspectors and health officers, 61 from practicing veterinarians, 20 from dairymen, and 56 from milk dealers.

The samples received from State agents and local inspectors and health officers were subjected to a very complete examination. The specific gravity, fat per cent., per cent. solids not fat, and the acidity were determined.

Tests were made for preservatives. The number of bacteria per c. c. was determined by the standard method. The fermentation tests was applied to determine the kind of bacteria predominating; the reductase test and the alcohol test were also applied, and in some cases the refractive index was determined. The samples received from the dairymen were accompanied by requests for certain examinations, usually the determination of the fat per cent. and the number of bacteria, while those received from veterinarians were usually examined for pathological bacteria, or for the purpose of detecting the cause of abnormal odors or tastes or too rapid curdling. The samples sent in by milk dealers were usually forwarded for a fat test and bacterial count.

The towns in which samples were collected by state agents or by local inspectors for the purpose of determining the character of the milk supply and the number of samples received from each town were as follows;

Town.	County.	Number.
Pennsburg,	Montgomery,	6
Radnor Township,	Delaware,	186
Ridley Park,	Delaware,	58
Doe Run,	Chester,	18
Leaman Place,	Lancaster,	63
West Chester,	Chester,	6
Phoenixville,	Chester,	135
Ronks Station,	Lancaster,	41
Zieglersville,	Montgomery,	70
Bristol,	Bucks,	39

Several of the above towns have milk inspectors who have cooperated with the Board in a systematic field examination in connection with the laboratory examination. These towns have made great improvements in their milk supplies during the past year and Boards of Health feel that this progress is due largely to the regular examination of their milk supply.

The laboratory has noticed in the past year a general improvement in the bacteriological counts of all samples examined.

During the past year the sediment test has been applied by State agents in a number of instances in connection with the laboratory examinations. This is not a new test, but the inspectors have found it to be of great benefit as it can be applied at the place of collection and demonstrates to the producers unclean methods of production.

Out of 892 samples examined, not one was found to contain preservatives. This is regarded as a great improvement, as it was very common a few years ago for unscrupulous persons to add such substances as formaldehyde, boric acid, salicylic acid, etc., to preserve the milk.

In regard to the conduct of the work at the laboratory for the ensuing year, it is recommended that when samples of milk are collected for laboratory examinations to determine the character of the milk supply of a local community that inspections of the dairy farms supplying the milk and of the dealers' premises be made by an agent of the Board at the same time and immediately before and after the collection of the samples, and further that when samples of milk are examined which have been collected either by local inspectors or agents of the Board and any sample is found defective in hygienic properties that the local inspectors or agents of the Board be required to make an inspection of the dairies concerned and report the conditions found to the Secretary of the Board.

PROSECUTIONS

January 1, 1914 to December 31, 1915

County	Act of	Section	Result
Chester.	July 22, 1913.	16	Guilty.
Chester.	July 22, 1913.	10	Guilty.
Chester.	July 22, 1913.	16	Guilty.
Chester.	July 22, 1913.	10	Guilty.
Chester.	July 22, 1913.	33	Guilty.
Chester.	July 22, 1913.	10	Guilty.
Franklin.	July 22, 1913.	29	Guilty.
Franklin.	July 22, 1913.	10	Guilty.
Franklin.	July 22, 1913.	10	Guilty.
Franklin.	July 22, 1913.	10	Guilty.
Mercer.	July 22, 1913.	10	Guilty.
Mercer.	May 26, 1897.	37	Guilty.
Susquehanna.	May 26, 1897.	37	Guilty.
Lancaster.	Federal.		Guilty.
Lancaster.	July 22, 1913.	26	Guilty.
Lancaster.	July 22, 1913.	9	Not Guilty.
Lancaster.	July 22, 1913.	27	Guilty.
Jefferson.	May 26, 1897.	37	Guilty.
Washington.	July 22, 1913.	10	Guilty.
Washington.	May 26, 1897.	37	Guilty.

ACCOUNTING DIVISION

FINANCIAL REPORT FOR THE YEAR 1914

The following is a statement of money expended by the different divisions of the Board from the several appropriations of the Legislature of 1913; with notes at the bottom of each fund showing the amount of fines or money collected in violation of the act and deposited in the State Treasury during the year 1914.

List of Funds

Indemnity and Expense, Act July, 22nd, 1913.
Tuberculin, July 22nd, 1913.
Interstate Inspection, Act July 22nd, 1913.
Rabies, Act July 22nd, 1913.
Meat Hygiene, Act May 25th, 1907, P. L. 234.
Horse Breeding, Act June 3rd, 1911.

INDEMNITY AND EXPENSE FUND

Balance on hand January 1st, 1914,			$199,602 41
Disbursements for the year 1914 as follows:			

MILK HYGIENE DIVISION

Indemnity for cattle condemned,	$45,437 90	
Examinations of dairies, post mortems, physical examinations and appraisements of cattle,	34,498 02	
Total,		$79,935 92

TRANSMISSIBLE DISEASE DIVISION

Services and Expenses connected with the Investigation of—

Glanders,	$2,961 43
Glanders (horses condemned),	8,074 00
Blackleg,	1,318 44
Anthrax,	394 63
Mange,	238 62

Rabies,		1,173 94		
Hog cholera,		2,092 18		
Miscellaneous diseases,		1,659 65		
Foot-and-Mouth,	Disinfectants,	1,696 05		
	Pumps, etc.,	528 06		
	Labor—burial and disinfecting,	8,055 76		
	Livery,	987 86		
	Supplies,	1,793 34		
	Services,	9,065 65		
	Expenses,	5,249 02		
	Clerical expenses,	1,589 01		
	Miscellaneous,	1,164 76		
Total,			$48,042 40	

CLERICAL AND MISCELLANEOUS EXPENSES INCLUDING SUPPLIES

Harrisburg, Philadelphia, Pittsburgh and Lancaster offices,		27,191 85	

STATE FARM

Labor, seed, fertilizer, supplies, etc.,	$8,448 85		
Production of hog cholera serum at State Farm,	7,716 91		
Total,		16,165 76	
Total disbursements January 1st, 1914 to January 1st, 1915,			171,335 93
Balance on hand January 1st, 1915,			$28,266 48

Note:—Miscellaneous money deposited in State Treasury during year, $83.21.

TUBERCULIN FUND

Balance on hand, January 1st 1914,	$17,092 52	
Expenditures—Services, expenses, laboratory supplies, etc.,	13,011 29	
Balance January 1st, 1915,		$4,081 23

INTERSTATE INSPECTION

Balance on hand, January 1st, 1914,	$6,725 67	
Expenditures—Services, expenses, miscellaneous,	2,221 42	
Balance January 1st, 1915,		$4,504 25

Note:—Deposited in State Treasury during the year, fines and witness fees for violation of Act of May 26, 1897, $191.00.

RABIES

Balance on hand, January 1st, 1914,	$8,714 66	
Expenditures—Services, expenses, advertising,	3,741 94	
Balance January 1st, 1915,		$4,972 72

MEAT HYGIENE

Balance on hand, January 1st, 1914,	$47,721 22	
Expenditures—Services, expenses and supplies,	28,803 78	
Balance January 1st, 1915,		$18,917 44

Note:—Deposited in State Treasury during the year, fines and witness fees for violation of Act of May 25, 1907, $88.44

HORSE BREEDING

Balance on hand, January 1st, 1914,	$6,269 98	
Expenditures—Services, expenses, supplies,	3,807 09	
Balance January 1st, 1915,		2,462 89

Note:—Fees for 1914 for the enrollment and licensing of stallions, deposited in State Treasury, $2,849.00.

ACCOUNTING DIVISION

FINANCIAL REPORT FOR THE YEAR 1915.

The following is a statement of money expended by the different divisions of the Board from the several appropriations of the Legislature of 1913 and 1915; showing a detailed summary of the cost of eradicating foot-and-mouth disease for the year 1915. Also showing a total cost to the State of Pennsylvania for foot-and-mouth eradication beginning with November, 1914, to and including December, 1915.

INDEMNITY AND EXPENSE FUND

Balance on hand January 1st, 1915,	$28,266 48	
Emergency appropriation, February 25th, 1915,	500,000 00	
Transferred, April 9th from the appropriation of 1913 for the control and suppression of rabies,	1,500 00	
Transferred, April 9th from the appropriation of 1913 for the meat hygiene service,	4,500 00	
Emergency appropriation, May 14th, 1915,	125,000 00	
Appropriated June 16th, 1915, for two years,	200,000 00	
Total,		$859,266 48

Disbursements for the year 1915 as follows:

MILK HYGIENE DIVISION

Indemnity for tubercular cattle,	$19,940 80	
Examination of dairies, post mortems, physical examinations and appraisements of cattle,	985 46	
Total,		$20,926 26

TRANSMISSIBLE DISEASE DIVISION

Services and Expenses connected with the investigation of—

Glanders,		$1,483 17	
Glanders (horses condemned),		12,594 20	
Blackleg,		1,097 42	
Anthrax,		377 02	
Mange,		25 50	
Rabies,		652 15	
Hog cholera,		1,129 08	
Miscellaneous diseases,		868 91	
Foot-and-Mouth,	Cattle,	452,981 35	
	Property destroyed,	41,029 34	
	Disinfectants and pumps,	6,489 66	
	Unskilled labor: Burial,	16,143 24	
	Disinfecting,	16,997 68	
	Livery in connection with burial and disinfection,	1,947 43	
	Supplies—rubber goods, etc.,	46,539 75	
	Services of agent,	46,539 75	
	Expenses,	39,049 52	
	Clerical expenses,	9,376 25	
	Miscellaneous,	5,044 79	
Total,			656,486 95

CLERICAL AND MISCELLANEOUS EXPENSES

Including services and expenses of agents and supplies for the Harrisburg, Philadelphia, Pittsburgh and Lancaster offices,	51,236 58	

STATE FARM

Labor, seed, fertilizer, supplies, etc.,	10,857 52	

(Out of this amount $5,548.55 was spent for hog cholera serum production at State Farm.)

Total disbursements January 1st, 1915, to January 1st, 1916,	739,507 31
Balance on hand January 1st, 1916,	$119,759 17

(Miscellaneous money deposited in State Treasury during the year, $195.62.)

Note.—Total cost of foot-and-mouth disease beginning with November, 1914, to and including December, 1915.

Cattle destroyed,	$452,981 35	
Property destroyed,	41,029 34	
Disinfectants and pumps,	8,713 77	
Unskilled labor, Disinfecting,	25,053 44	
Unskilled labor, Burial,	16,195 89	
Livery in connection with burial and disinfecting,	2,935 29	
Supplies,	4,453 83	
Services,	55,605 40	
Expenses,	44,298 54	
Clerical expenses,	10,965 26	
Miscellaneous,	6,209 55	
Total,		$668,441 66

Explanation.—There is a difference of $52.65 between the total of foot-and-mouth eradication as shown by note above and by the total as shown by the 1914 and 1915 financial reports. This is occasioned by a duplicate payment with the Bureau of Animal Industry, U. S. Department of Agriculture. The money was refunded to the State Livestock Sanitary Board, redeposited, and rechecked making the total cost as shown by note above $52.65 more than the total as shown by the financial reports of 1914 and 1915.

TUBERCULIN FUND

Balance on hand January 1st, 1915,	$4,091 23	
Expenditures—Services, expenses, laboratory supplies, etc.,	4,080 97	
Unexpended balance,		$0.26

Account closed.

INTERSTATE INSPECTION

Balance on hand January 1st, 1915,	$4,504 25	
Expenditures—Services, expenses, miscellaneous,	1,952 67	
Unexpended balance reverting to State Treasury,		$2,551 58

Account closed.

RABIES

Balance on hand January 1st, 1915,		$4,972 72	
Expenditures—Services, expenses, advertising,	$247 77		
Transferred to indemnity and expense fund, April 9th, 1915,	1,500 00	1,747 77	
Unexpended balance reverting to State Treasury,			$3,224 95

Account closed.

MEAT HYGIENE

Balance on hand January 1st, 1915,	$18,917 44	
Appropriated by the 1915 Legislature, June 16th,	58,000 00	
Total,		$76,917 44

Expenditures—Services, expenses and supplies,	$29,341 83		
Transferred to indemnity and expense fund, April 9th, 1915,	4,500 00		
Unexpended balance of 1913 appropriation reverting to State Treasury,...	256 26	34,098 09	
Balance on hand January 1st, 1916,			$42,819 35

Note.—Deposited in State Treasury, violation act, May 25th, 1907, $5.00.

HORSE BREEDING

Balance on hand January 1st, 1915,	$2,462 89		
Appropriated by the 1915 legislature, June 16th,	6,000 00		
Total,		$8,462 89	
Expenditures—Services, expenses and supplies,	$3,812 38		
Unexpended balance of 1913 appropriation reverting to State Treasury,...	415 07	4,227 45	
Balance on hand January 1st, 1916,			$4,235 44

Note.—Fees for the enrollment and licensing of stallions, deposited in State Treasury, $2,626.00.

Respectfully submitted,

C. J. MARSHALL,

State Veterinarian and Secretary State Livestock Sanitary Board.

REPORT OF THE ECONOMIC ZOOLOGIST.

Hon. Charles E. Patton, Secretary of Agriculture, Harrisburg, Pa.

Dear Sir: I have the honor to submit the report of the Economic Zoologist for the year 1915.

The services of the Bureau of Zoology of the Department of Agriculture have been rendered through the two branches of (A) Office Work and (B) Field Work. I have reason to believe that they have given highly satisfactory results to all persons concerned and have stimulated the interest in pest suppression according to most modern methods, curtailing the loss of millions of dollars worth of agricultural property in this State, and especially resulting in better orchard methods which have given fruits of very high quality. A detailed report of this Bureau should, therefore, be given under the following respective heads:

(A) OFFICE WORK

The office work was continued during the year by the usual force of employes. Mr. John K. Musgrave, of Pittsburgh, resigned as Assistant Economic Zoologist in order to devote his attention to advanced professional studies, and Mr. P. T. Barnes, of Harrisburg, was appointed Acting Assistant. Mr. Enos B. Engle, of Chambersburg, continued as Chief Nursery Inspector, with a desk in this office, and other office employes are as follows:

Miss Katharyn P. First, of Harrisburg, Chief Stenographer;

Miss Helen M. Nesbit, of Lewisburg, Stenographer and Accountant.

Miss Mary E. Evans, of Harrisburg, Stenographer;

Miss Annie L. Boyer, of Harrisburg, Clerk in Charge of Files and Reports;

Prof. V. A. E. Daecke, of Harrisburg, Clerk in Charge of Collection and Scientific Identification of Insects;

Mr. Harry B. Kirk, of Harrisburg, Assistant Clerk in Charge of Collections, Investigations and Inspections, and in Charge of Photography;

Mr. Albert Sawyer, of Harrisburg, Assistant, aiding in the work of Mr. Kirk and Prof. Daecke;

Mr. J. C. Simmons, of New Cumberland, Messenger.

(1) CORRESPONDENCE

The chief feature of the office work has been the correspondence as shown by the fact that during the year 7,377 letters were written in this office, which were of sufficient importance to justify copies being retained, besides tens of thousands of circulars and mimeographed letters. Most of these were personal letters in response to letters of inquiry which are kept on file in such systematic manner as to be found for immediate reference. The range of subjects of this correspondence is remarkable, as it includes almost all topics to which the mind of man can turn; but our method is to refer to specialists all subjects not within our professional scope. We make a special effort to help inquirers find the answer to their questions when not within the field of our own profession, and this service seems to be particularly valued by our citizens.

All letters are indexed with a double index; one giving the name of the writer and the other the subject or subjects. Although we issue many publications, it becomes necessary to meet the needs of individual inquirers through a very specific and often voluminous correspondence. It can be seen that the correspondence of this office must, according to its specific nature, be much more extensive than general business correspondence.

(2) FILING

Systematic filing of letters, index cards, literature and reports of inspectors demands considerable attention. It should be remembered that the reports of the orchard inspectors, nursery inspectors, and those of the apiary inspectors come to this office for the attention they should have. This necessitates extra correspondence in sending out to owners of orchards or apiaries statements of pests found, literature on methods of their suppression, and also the proper filing of these reports in systematic manner. Likewise reports of the work done in the demonstration orchards and supervision orchards are filed in order, and in addition to this service record is kept of all expenses of all employes, and of all services daily rendered by each person not engaged in the office work. We also receive all Bulletins published by the U. S. Department of Agriculture, and by all the State Experiment Stations, and other Departments of Agriculture, and indeed most such literature from other countries. This must all be scanned in order to keep up with the times in most modern methods of pest suppression, and must also be filed and indexed for future reference.

At this office we receive the Index Cards of the U. S. Department of Agriculture, indexing all literature of the Federal Government and of the various Experiment Stations. These likewise are filed, and accessible to all interested persons, as it is very valuable and important, being, we believe, the only file of such Index Cards between State College and Philadelphia.

(3) COLLECTIONS

This Bureau has one of the largest collection of insects, both beneficial and injurious, that is found in Pennsylvania, and one of the very best collections, in regard to carefulness of preparation and full data, that is to be found anywhere in the world. Eminent authorities have said they wished they could afford such system as we started in this collection, and have endeavored to maintain. It is very important that we have a full collection of the insects of Pennsylvania in their different stages, also showing the work they do. Daily we are liable to receive specimens which can best be named by comparison. Until the name is ascertained we can not cite literary references, nor find statements concerning the habits of specimens in question. The collection is very valuable. It is also used in connection with illustrations for educational addresses, photographs for publications, and exchanges with other collectors, especially with high school teachers in this State. It is our earnest desire to see it made as complete as possible at an early date. In this connection we have run a series of breeding cages, and have worked out the life histories and habits of numerous species of insects of importance. We have bred several species of parasites of the San José scale, and have reared other insects which could not otherwise have been determined. The breeding cage work in the insectary is very important.

(4) INVESTIGATIONS

But little time has been found for investigations, yet it is necessary to make certain experiments and investigations along certain lines in economic entomology. New insecticides are constantly coming on the market, and our citizens are making inquiry concerning their value. We can not answer such inquiries without personal experiments, as many of the materials are too new to have been tested and reported by other persons.

For example, we found last summer by practical test that the dry sulfur compounds on the market for spraying are quite liable to burn the foliage of plants. Many persons reported to us disastrous results from the use of such material, which, in general, is not lime-sulfur compound but soda-sulfur, and hence very caustic.

In our investigations of life histories and habits of destructive insects, one of unusual interest was taken up. This was the Red Leaf Beetle *(Galerucella cavicollis)*. The results of these studies are described in the following Press Circular:

"NEW PEST ATTACKS FRUIT TREES.

Important discoveries in the habits of the Red Leaf Beetle, recently found in Pennsylvania, have been made by Zoologist H. A. Surface of the Department of Agriculture. Professor Surface after exhaustive investigations has been able to report on the native food plants, habits and remedies of the Red Leaf Beetle, which formerly were not known, and which have never before been published.

The insect has been very destructive in several counties in the northern and central portions of Pennsylvania, feeding upon foliage of cherry, peach, apple, pear and some other trees, shrubs and plants. It has been proven that the native food plant of the mature beetle, as well as its larva, is the Pennsylvania fire cherry (Prunus Pennsylvanicus). The larvae do not feed on any other kind of plant, but they completely defoliate the wild fire cherry, which is the species of wild cherry with small fruits hanging in clusters on bunches, which are red in color when ripe.

In the mountain districts from the central part of Pennsylvania northward this fire cherry grows very abundantly, and it is in this region that the Red Leaf Beetle has proven destructive in the past two years. An important practical point is to be noted, that while the mature beetles feed on the leaves of many kinds of trees, especially the cultivated cherry, peach and plum, and sometimes upon apple and pear, they do not lay their eggs upon these cultivated trees, laying on the fire cherry only, and the larvae of this species of beetle have never been found damaging any other kind of plant than the wild fire cherry.

The life history of this insect was worked out by the Department of Agriculture through representatives of the Bureau of Zoology, and was found to be as follows: The beetles in the early part of the summer feed on the leaves and crawl down the trunks of the fire cherry trees to or near the surface of the ground, where they deposit their eggs at the base of the tree trunk, and on the surface of the ground and in rubbish. After a few daws in the form of the small yellow eggs there hatch dark green grubs, which climb the trunks of the trees, feed on the leaves, molt and become lighter in color. As they complete their growth they go down to the soil to pupate or transform into beetles. The mature beetles come forth in the fall, climbs trees again, and feeds for a short time, and then scatters to places of safety to spend the winter, chiefly in rubbish, and such other places where it can find protection.

The fundamental or best general remedy, is plainly in the destruction of the fire cherry trees, but the best local remedy consists in spraying with one ounce of arsenate of lead in each gallon of water, whenever the beetles or their larvae are destructive. As the fire cherry tree is of no economic value, there would be no loss in its destruction to get rid of this new pest, which has already effected considerable damage to the fruit interests in the northern and central portions of Pennsylvania."

(5) PHOTOGRAPHS AND SLIDES

It is necessary to preserve in a photographic form much of the important and interesting material coming to this office. As we are called upon to write for publications or to speak before the public, it can be used for illustrations either in Bulletins or as slides. We are gradually accumulating one of the very best collections of important photographs of pests and their work, and horticultural subjects. Mr. H. B. Kirk has taken a special interest in assisting in this work. The plates and photographs are numbered and filed in systematic order, and under my directions many slides have been made for illustrating lectures. We appreciate the co-operation of other officials in the Capitol Building in providing room and equipment for this important photographic service.

(6) PUBLICATIONS

The publications of the office of the Bureau of Zoology have been in the form of the Bi-Monthly Bulletins of the Bureau of Zoology of the Department of Agriculture, and the Weekly Press Letter and occasional articles to newspapers and other preiodicals. In the Bi-Monthly bulletins were published the chief articles for the public, discussing various subjects in horticulture, pest suppression, bird preservation, tree planting, better fruit production, fumigation and others of general and practical interest.

Requests have been received for these bulletins from different states in the Union and different countries, showing that they have been appreciated. We have made it a rule to publish nothing that was not correct and practical. Our bulletins on the agricultural value and the preservation of birds have been especially helpful to teachers in high schools and to high school pupils in the construction of bird boxes, and have set forth various devices and suggestions for feeding and protecting the birds.

The Weekly Press Letter was issued regularly with a view toward publishing timely information, chiefly in regard to orcharding and pest suppression. At the close of the year it was discontinued because these subjects were embodied in the Weekly Press Bulletin of the Department. Some of them were republished in more permanent form in the Bi-Monthly bulletins to meet requests from our citizens who desired these short articles in such manner that they can be preserved.

Occasionally a correspondent or an orchard inspector reports an outbreak of insect pests, or some other special topic upon which the public requires information in some particular section of the State, and on such occasions special articles are prepared and sent to the newspapers in that region.

(7) PUBLIC ADDRESSES

There is a general call on the Economic Zoologist for public addresses before organizations of various kinds, and as he regards this as one of the important means of meeting and serving the public he accepts such invitations as far as other duties will permit. During the year 1915 no less than 35 public addresses were made, 12 of which were illustrated with lantern slides. These were on various topics in relation to economic zoology, entomology, horticulture, wild life protection, pest suppression, bird preservation and others of a kindred nature.

(B) FIELD WORK

(1) THE ORCHARD INSPECTION SERVICE

The orchard inspection service has been one of the most important features of work undertaken at any time for our agricultural people. Men trained to recognize pests, and to know the needs of orchards, went systematically through the orchards, and, in fact, inspected absolutely all cultivated trees, bushes and shrubs, whether on a small area or large, for the purpose of determining what pests were present and helping to instruct the owners as to what to do to overcome them and produce better fruits. Each orchard inspector gave a written report of his findings to the owner of the premises and also sent a copy to this office. We in turn wrote to the owner sending him circulars of information on the subject of the kind or kinds of pests that were discovered. Where help was needed incidentally on some feature or orcharding, it was freely given. In many cases owners found that their properties were infested with very serious insects, such as the San José scale, of which they were not formerly aware, and in other cases they found that the insects present were not as important or destructive as they had believed them to be. The methods recommended resulted in better fruit production, and an awakening to higher possibilities and better general results.

The important fact is to be reported that during the year 1915 the first orchard inspection work in the State of Pennsylvania was completed, after a long, steady pull, by earnest and faithful inspectors, during a period of eight years. During this year inspections were made that completed the following counties: Allegheny, Berks, Crawford, Fayette, Washington and Westmoreland. The accompanying maps, showing the spread of the inspection work over the State are very interesting. It must be remembered that it took twenty-five men eight years to do this work. During this time each man was constantly going to new territory and overlapping his old territory only to the extent that was necessary to keep up the work in the demonstration and supervision orchards. During this period of change it was possible for several new pests to come in the territory first inspected, and it would be much better for the growers of crops if there were funds enough to employ a force large enough to complete the inspection at least once every four years.

(2) DEMONSTRATION ORCHARDS

It was necessary to maintain the services in the older established Demonstration Orchards, and also to establish many new ones.

The people saw the benefits of this demonstration service as never before, and instead of saying they had enopgh, they called for more. During the year we had 262 public demonstration orchards, distributed in the different counties as follows:

Adams,	1	Lancaster,	5
Allegheny,	5	Lawrence,	3
Armstrong,	6	Lebanon,	7
Beaver,	9	Lehigh,	1
Bedford,	11	Luzerne,	3
Berks,	6	Lycoming,	6
Blair,	3	McKean,	4
Bradford,	2	Mercer,	8
Bucks,	5	Mifflin,	2
Butler,	4	Monroe,	2
Cambria,	6	Montgomery,	3
Cameron,	2	Montour,	1
Carbon,	2	Northampton,	5
Centre,	2	Northumberland,	4
Chester,	3	Perry,	3
Clarion,	3	Philadelphia,	2
Clearfield,	5	Pike,	2
Clinton,	1	Potter,	5
Columbia,	7	Schuykill,	6
Crawford,	5	Snyder,	3
Cumberland,	2	Somerset,	7
Dauphin,	3	Sullivan,	1
Delaware,	2	Susquehanna,	4
Elk,	1	Tioga,	8
Erie,	4	Union,	2
Fayette,	6	Venango,	6
Forest,	1	Warren,	4
Franklin,	1	Washington,	5
Fulton,	1	Wayne,	8
Greene,	3	Westmoreland,	7
Huntingdon,	3	Wyoming,	1
Indiana,	4	York,	5
Jefferson,	4		
Juniata,	2		
Lackawanna,	4	Total,	262

In most of these orchards public meetings were held showing methods of pruning and of making proper insecticides and fungicides, and also applying the same. The chief material used for the dormant spray was lime-sulfur solution, either home-boiled or commercial. In every orchard we made enough to show the methods of preparation. These consist in using two pounds of sulfur for each pound of fresh lime and for each gallon of water. The lime unslaked is put into the kettle, and enough water is stirred with the sulfur to make it pasty, and this is poured over the lime, and enough water is added to slake it. The fire is started, and some more water is added and the boiling continues. It is then boiled from one-half to three-quarters of an hour and allowed to settle, or is strained and stored for future use to be diluted with the hydrometer test to specific gravity test of 1.03, which is generally about one part of the concentrated material thus prepared to seven parts of water.

This formula is only for dormant spray. As a spray material, when in leaf, we used on the pome fruits (apple, pear and quince) one gallon and one quart of concentrated lime-sulfur solution in forty-nine gallons of water, thus making a fungicide for spraying on leaf and fruit, and to this was added one pound of dry arsenate of lead, or two pounds of arsenate of lead paste, to act as an insecticide for chewing insects, such as the Codling moth, Tent-caterpillar, Bud moth, Grasshoppers, Canker worms, Webworm, Curculio and others. This application was made just after the petals fell, and again in a month.

On the stone fruits we used only one quart of strong lime-sulfur solution in forty gallons of water, adding the arsenate in the proportion mentioned above. For suctorial insects, such as the Red bug, young scale insects, plant lice, leaf hoppers and other suctorial insects, we used one ounce of commercial tobacco decoction, and one-quarter pound of soap in five gallons of water. We found also that by spraying apple trees just after the green tips of the leaves commence to show on the buds, using the strong lime-sulfur solution, we killed the apple aphids which had then hatched. For the very best possible results we recommend an extra fungicidal spraying, especially for apple scab, about the time the blossom clusters are separating, but before the petals open, and another about the latter part of July, which is about time for spraying for the second brood of the Codling moth.

There has been no one feature contributing so greatly to the speedy improvement and quality of Pennsylvania fruit as the work in the Demonstration Orchards. Buyers of fruit sought these orchards for fruit which was properly treated, and hence they knew it was good. In some places they bought only the sprayed fruits, and would not even look at the fruits in unsprayed orchards.

(3) SUPERVISION ORCHARDS

The call for service in the Demonstration Orchards was so great that it was quite impossible to reach all of them; hence, to give individual service we found it necessary to maintain a supervision system of orchard management by which we went to the premises and spent at least a day with the owner showing him how to proceed, and going over the entire subject of his orchard, writing out a plan of management for the year, leaving a copy of the same with him and sending another copy to this office for filing and observation. During the year service was given in 1051 Supervision Orchards distributed in different counties in Pennsylvania, as follows:

Adams,	13
Allegheny,	56
Armstrong,	12
Beaver,	12
Bedford,	11
Berks,	17
Blair,	13
Bradford,	52
Bucks,	47
Butler,	25
Cambria,	17
Cameron,	1
Carbon,	7
Chester,	11
Clarion,	4
Clearfield,	5
Clinton,	1
Columbia,	8
Crawford,	9
Cumberland,	7
Dauphin,	6
Delaware,	13
Elk,	5
Erie,	12
Fayette,	12
Forest,	1
Franklin,	12
Fulton,	2
Greene,	6
Huntingdon,	9
Indiana,	5
Jefferson,	14
Juniata,	14
Lackawanna,	19
Lancaster,	28
Lawrence,	23
Lebanon,	24
Lehigh,	8
Luzerne,	13
Lycoming,	32
McKean,	8
Mercer,	26
Mifflin,	7
Monroe,	5
Montgomery,	20
Montour,	3
Northampton,	16
Northumberland,	10
Perry,	19
Philadelphia,	5
Pike,	4
Potter,	18
Schuylkill,	27
Snyder,	8
Somerset,	6
Sullivan,	4
Susquehanna,	29
Tioga,	34
Union,	18
Venango,	20
Warren,	11
Washington,	32
Wayne,	27
Westmoreland,	32
Wyoming,	37
York,	24
Total,	1,051

The call for this Supervision Orchard service continues, and it can be seen that as the Demonstration and Supervision Orchard work increases, the amount of time given to the inspection service must decrease. With an increased fund and a larger force more prompt individual service could be given to all. It is greatly needed and demanded by the orchard owners in every county. We must have funds for this service.

(4) NURSERY INSPECTION

Nursery Inspection has not in any way been neglected. The regular inspection service has been given in every nursery of the State twice per year, and the nurserymen are appreciating this helpful work more than ever before. We have found it possible to respond to their request to detail a man for Nursery Inspection service practically to live in the larger nurseries, and watch for the appearance of pests, which are to be reported to us and suppressed at once. This kind of work results in clean stock, and the customers can know that nurseries thus inspected are free from devastating pests that would destroy their property. A detailed report of the Nursery Inspection service follows:

List of Pennsylvania Nurserymen whose Nurseries have been Inspected Twice, and who have been Granted Certificates of Inspection and License to Sell and Ship Nursery Stock during the Year Ending December 31, 1915:

		Acres.	Certificate Number.
Adams County.			
H. G. Baugher,	Aspers,	20	B—838
W. W. Boyer & Bro.,	Arendtsville,	3½	B—840
E. W. Hartman,	Cashtown,	2	B—687
C. A. Hartman,	Cashtown,	4	B—688
Geo. Oyler,	Gettysburg,	5	B—695
H. R. Plank,	York Springs,	7	B—753
C. A. Stoner,	Gettysburg,	2	B—686
Taylor & Heckenluber,	Biglerville,	2	B—693
D. I. Weaver,	Gettysburg,	¼	B—694
Chester B. Worley,	York Springs,	4	B—760
Allegheny County.			
August Espe,	Perryville,	1	B—876
Elliott Nursery Co.,	Springdale,	30	B—650
George Bros.,	Springdale,	3	B—651
A. W. Smith Co., Keenan Bldg.,	Pittsburgh,	½	B—649
McRab Jenkinson Co., (Greenhouse),	Cheswick,	......	B—870
Beaver County.			
Keystone State Nurseries, 612 Union Bank Bldg.,	Pittsburgh,	......	B—878
*J. P. Arnold & Bro.,	Beaver Falls,	5	B—655
H. E. Groetzinger,	Darlington,	¼	B—715
*J. M. Hoyt,	Industry,	7	B—654
R. C. Mackall,	Beaver,	4	B—656
Berks County.			
Bertrand H. Farr,	Wyomissing,	60	B—834
John Rick,	Wernersville,	1	B—745
Thos. J. Oberlin,	Sinking Spring,	......	B—642
Blair County.			
Geo. S. Burket,	Claysburg,	½	B—648
Bradford County.			
F. W. Card,	Sylvania,	½	B—737

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*Grow berries or small fruit plants only.

		Acres.	Certificate Number.
Bucks County.			
Geo. W. Smith,	Kintnersville,		B—794
J. L. Lovett,	Emilie,	10	B—833
Mahlin B. Fretz,	Newtown,	6	B—868
D. Landreth Seed Co.,	Bristol,	2	B—835
M. A. Youngken,	Richlandtown,	1/4	B—771
Penna., R. R. Co., John Foley, Forester, Philadelphia, Nursery near,	Morrisville,	40	B—643
The Wm. H. Moon Co.,	Morrisville,	450	B—
Andrew K. Stear,	Perkasie,	2	B—865
Nott Farm School,	Farm School,	1	B—775
Butler County.			
James R. Peirce,	Butler,	3	B—653
Harmony Nurseries, Inc.,	Evans City,	4	B—652
Carbon County.			
Robert Getz,	Albrightsville,	......	Special
Centre County.			
Prof M. G. Kains, State College Department of Horticulture,	State College,	2	B—824
Chester County.			
E. A. Stroud,	Strafford,	......	B—795
W. H. Doyle,	Berwyn,	40	B—839
The Morris Nursery Co.,	West Chester,	150	B—702
The Conard & Jones Co.,	West Grove,	30	B—662
The Dingee & Conard Co.,	West Grove,	12	B—660
The Rakestraw Pyle Co.,	Kennett Square,	150	B—731
Hoopes Bro. & Thomas Co.,	West Chester,	600	B—703
J. B. Reif,	Spring City,	1	B—805
E. B. Keating,	Kennett Square,	2	B—796
Louis B. Eastburn,	Kennett Square,	2	B—849
H. H. Corson & Son,	Avondale,	2	B—733
Milton Clevenstine,	Kimberton,	1	B—800
A. W. Van Tassel,	Kennett Square,	2	B—850
John Alcorn,	Malvern,	1/4	B—776
Edward W. Twaddell,	Westtown,	3	B—849
Pennypacker & Son,	Phoenixville,	1	B—768
Carl B. Thomas,	West Chester,	2	B—874
Frank M. Thomas,	West Chester,		B—873
Clearfield County.			
W. S. Wright,	Clearfield,	1/2	B—647
Penna. Dept. of Forestry (W. F. Dague, Forester),	Clearfield,	2	B—713
Columbia County.			
Philip Harris, R. F. D. 5.,	Bloomsburg,	1	B—598
T. D. Robbins, R. F. D. 5,	Bloomsburg,	1 1/2	B—609
Frank Harris,	Light Street,	2	B—864
Crawford County.			
*David Kelty,	Cochranton,	2	B—677
*Bailey Bros, R. D. No. 66,	Cochranton,	19	B—675
*Henry Roberts, R. D. No. 66,	Cochranton,	4	B—674
*J. O. Marsh & Son,	Geneva,	8	B—698
J. B. Long,	Harmonsburg,	2 1/2	B—699
*Wilson Hood,	Cochranton,	1/2	B—427
*F. P. Hood,	Cochranton,	1/2	B—425
*E. A. Bisbee. (Nursery in Venango Co),	Titusville,	2	B—704
*Samuel J. Cooper,	Cochranton,	2 1/2	B—690
*W. H. Chatty,	Cochranton,	......	B—676
*C. C. Deter,	Cochranton,	......	B—679

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*Grow berries or small fruit plants only.

		Acres.	Certificate Number.
*Frank F. Smith,	Cochranton,	......	B—681
*C. P. Bailey,	Geneva,	......	B—716
*W. H. Miller,	Guys Mills,	......	B—759
Cumberland County.			
R. A. Wickersham,	Mechanicsburg,	40	B—726
Mrs. E. H. Spain,	Camp Hill,	¼	B—879
Dauphin County.			
*M. S. Brinser,	Middletown,	2	B—741
The Berryhill Nursery Co.,	Harrisburg,	25	B—641
*Andrew Coble,	Middletown,	2	B—739
C. B. Landis,	Penbrook,	¼	B—610
*David Z. Miller,	Middletown,	1	B—742
C. P. Scholl,	Halifax,	7	B—740
Robt. J. Walton,	Hummelstown,	1	B—746
T. A. Woods,	Harrisburg,	1	B—555
*Wm. A. Ulrich,	Middletown,	½	B—743
J. A. Christman,	Fort Hunter,	......	B—644
Delaware County.			
Mrs. Elizabeth Supplee,	Collingdale,	5	B—790
J. J. Styer,	Concordville,	3	B—836
M. J. Porter,	Wayne,	......	B—847
C. H. Pettiford,	Lansdowne,	½	B—782
W. E. Caum (Lessee),	Haverford,	15	B—790
John G. Gardner,	Bryn Mawr,	15	B—791
H. H. Battles,	Newtown Square,	5	B—802
Otto Lochman,	Wallingford,	2	B—860
Sylvia Spoltore,	Collingdale,	½	B—769
Erie County.			
Wm. H. Fenton & Son,	North Girard,	3	B—869
W. C. Eagley,	North Giard,	2½	B—853
*S. J. Allis, estate,	Erie,	¼	B—705
Bauer Floral Co.,	Erie,	¼	B—754
L. C. Hall,	Avonia,	¼	B—700
F. C. Hetz,	Fairview,	10	B—709
Lake Shore Nurseries,	Girard,	10	B—711
*J. N. Meader,	North Girard,	5	B—701
*Leon D. Moore,	Corry,	2	B—706
F. G. Mohring,	North Girard,	6½	B—854
*J. W. Orton,	North East,	1	B—757
Penna. Nursery Co.,	Girard,	75	B—708
*C. S. Post,	North East,	5	B—852
*Amos C. Remington,	North East,	¼	B—748
Stark Bros. Nurseries and Orchards Co.,	North Girard,	125	B—696
*W. L. Silverthorn,	North Girard,	2	B—855
*W. E. Smith,	North East,	½	B—856
*A. F. Youngs,	North East,	¼	B—758
*A. J. Youngs,	North East,	1	B—857
Verne L. Schluroff,	Erie,	¼	B—749
J. V. Laver,	Erie,	½	B—756
Thos. M. Silverton,	North Girard,	......	B—697
E. A. Orton,	North East,	......	B—858
H. S. Loop,	North East,	¼	B—875
J. J. Bernot,	Mooreheadsville,		B—755
Franklin County.			
*C. W. Reichard,	Waynesboro,	1	B—872
Penna. Dept. of Forestry (Mont Alto Nursery), Geo. A. Retan, Forester,	Mont Alto,	7	B—844
Henry Eicholz (Florist),	Waynesboro,	¼	B—841
Mira L. Dock,	Fayetteville,	¼	B—842
Penna. Dept. Forestry,	Fayetteville,		B—843

¼Grow berries or small fruit plants only.

		Acres.	Certificate Number.
Huntingdon County.			
G. B. Horton,	Trough Creek,	......	B—714
J. A. Runk,	Huntingdon,	¼	B—646
Penna. Dept. Forestry,	McAlveys Fort,	......	B—712
Juniata County.			
*S. H. Graybill,	Richfield,	5½	B—818
*John H. Shellenberger,	McAllisterville,	9	B—815
*C. S. Winey,	McAllisterville,	1½	B—552
*C. J. Pellman & Son,	Richfield,	5½	B—817
Andrew Banks,	Mifflintown,	12	B—816
Lackawanna County			
John W. Shephard, 945 Clay Ave.,	Scranton,	4	B—862
Daniel O'Hora,	Dunmore,	¼	B—810
Lancaster County.			
D. M. King, R. F. D. 2,	Gordonville,	......	B—867
Maurice P. Brinton,	Chistianna,	3	B—722
W. P. Bolton & Son,	Holtwood,	3	B—718
O. W. Laushey,	Smoketown,	2	B—750
J. W. Root, R. D. No. 1,	Manheim,	20	B—721
David S. Herr, R. D. No. 7,	Lancaster,	25	B—717
M. H. Musser,	Lancaster,	1	B—725
B. F. Barr & Co.,	Lancaster,	26	B—724
John G. Rush,	West Willow,	1	B—720
Geo. W. Park,	La Park,	½	B—645
J. F. Jones,	Willow Street,	5	B—712
Fred Spinner,	Lititz,	8	B—722
Lawrence County.			
Butz Bros.,	New Castle,	¼	B—657
A. S. Moore,	New Castle,	½	B—616
Lehigh County.			
Lehigh Nurseries,	Allentown,	1	B—784
*Mrs. Preston J. Kline,	Coopersburg,	½	B—722
*Oscar Young,	Cooperburg,	......	B—863
Luzerne County.			
Miss M. A. Maffet,	Wilkes-Barre,	¼	B—811
F. B. Wheeler,	Wyoming,	½	B—788
Warren E. Straw,	Wilkes-Barre,	2	B—806
*Keystone Strawberry Co.,	Hazleton,	2	B—789
R. S. Barry,	White Haven,	......	Special
Lycoming County.			
J. C. Moore,	Montoursville,	1½	B—778
Penna. Forestry, Bald Eagle Forestry Nursery (Edgar H. Smith, Forester),	Elimsport,	¼	B—685
Elmer D. Hess,	Unityville,	......	B—814
McKean County.			
Mrs. Dan B. Hilman, & Howard Hall,	Port Allegany,	.....	B—861
Mercer County.			
*J. N. Hughes,	Mercer,	1	B—665
Lackawanna Orchards,	Mercer,	½	B—669
*H. H. McClearn,	Stoneboro,	4	B—669
*B. R. McClearn,	Stoneboro,	1	B—622
*John W. Proud,	Stoneboro,	2	B—671

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*Grow berries or small fruit plants only.

		Acres.	Certificate Number
*W. M. Doyle,	Stoneboro,	5	B—670
*Robert Doyle,	Stoneboro,	1	B—443
Hugh Hogue, R. D.,	Carlton,	3	B—682
*Augustus Doyle,	Stoneboro,	4	B—667
*A. W. Carlson,	Stoneboro,	2	B—668
*Olaf Hansen,	Stoneboro,	3	B—673
W. R. Cribbs,	Mercer,	......	B—666
Mifflin County.			
Penna. Dept. of Forestry, Tom. C. Bietsch (Forester), Nursery and Forest Reservation near Greenwood, Huntingdon Co., Pa.,	Belleville,	2	B—420
Monroe County.			
W. K. La Bar,	East Stroudsburg,	......	Special
Montgomery County.			
Alex. Cummings & Son,	Centre Square,	½	B—781
Chris. Koehler,	Cheltenham,	2	B—812
R. B. Haines Co.,	Cheltenham,	10	B—859
J. B. Heckler,	Lansdale,	½	B—767
J. W. Thomas & Sons,	King of Prussia,	90	B—784
J. Krewson & Sons,	Cheltenham,	30	B—765
J. B. Moore,	Hatfield,	2	B—807
Adolph Mueller,	Norristown,	25	B—732
Thomas Meehan & Sons,	Dresher,	215	B—727
Wm. Sturzebecher,	Lansdale,	2	B—766
J. F. Birmingham,	Weldon,	½	B—846
J. G. Steffin,	Norristown,	4	B—734
Somerton Nurseries, A. U. Bannard, Mgr., 125 S. 5th St., Philadelphia,	Somerton,	20	B—802
A. E. Wohlert,	Narbeth,	15	B—783
Penna. School of Horticulture for Women,	Ambler,	3	B—837
Harry O. Leopold, R. D. No. 3,	Royersford,	¼	B—866
John A. Albrecht,	Pencoyd,	......	B—779
Northampton County.			
Theodore Roth,	Nazareth,	¼	B—785
Hays Nursery Co.,	Easton,	½	B—787
Easton Cemetery Co.,	Easton,	½	B—786
Northumberland County.			
S. L. Cummings,	Dewart,	1	B—813
Perry County.			
Geo. A. Wagner, R. F. D.,	Landisburg,	2	B—797
Silas Dewalt,	Landisburg,	1	B—801
Philadelphia County.			
W. W. Harper,	Chestnut Hill,	500	B—678
Thos. Meehan & Sons, Inc.,	Germantown,	60	B—661
T. N. Yates & Co.,	Mt. Aairy,	6	B—659
John B. Lewis,	Torresdale,	10	B—762
A. F. O'Connell,	Overbrook,	70	B—845
John Stephanson's Son,	Oak Lane,	3	B—799
Phila. & Reading R. R. Co., Nursery at Wayne Junction,	Philadelphia,	½	B—792
W. Atlee Burpee,	Philadelphia,	B--623	Special
H. F. Michel Co.,	Philadelphia,	39	B—793
Dr. Thos. J. Clemens, Inquirer Building,	Philadelphia,	4	B—780
Harry S. Betz, Wyoming Ave.,	Olney,	15	B—780
John C. Wester,	Germantown,	......	B—854
Potter County.			
M. L. Benn,	Coudersport,	1½	B—683

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*Grow berries or small fruit plants only.

		Acres.	Certificate Number.
Snyder County.			
*Geo. W. Beaver, R. D. No. 4,	Middleburg,	5	B—821
*Jno. F. Boyer, R. D. No. 4,	Middleburg,	8	B—820
*Geo. Dreese,	Mt. Plesant Mills,	2	B—826
F. L. Hancock,	Dalmatia,	1½	B—829
*John H. Moyer,	Swineford,	3	B—822
E. S. Shafer,	Port Trevorton,	4	B—801
*Elias Staucer, R. D. No. 1,	Port Trevorton,	2	B—800
*Allen S. Sechrist, R. D. No. 2,	Port Trevorton,	1	B—828
*J. M. Hornberger,	Middleburg,	1	B—823
*Henry Witmer, R. D. No. 2,	Port Trevorton,	2	B—825
*W. S. Shafer, R. D. No. 1,	Port Trevorton,	2½	B—819
*H. A. Shafer, R. D. No. 1,	Port Trevorton,	1½	B—827
Susquehanna County.			
*E. A. Smith,	Heart Lake,	7	B—809
*Geo. P. Sprout, R. D. No. 66,	Montrose,	4	B—808
Tioga County.			
*Homer B. Howe,	Wellsboro,	2½	B—684
Penna. Dept. of Forestry, Paul H. Mulford, Forester,	Asaph,	13	B—798
Union County.			
C. K. Sober (Nursery near Paxinos, Northumberland Co.),	Lewisburg,	43	B—747
Warren County.			
D. D. Hamblin,	Youngsville,	2	B—707
Washington County.			
Geo. Vanderslice,	Monongehela,	......	B—744
Wayne County.			
A. V. Tyler,	Damascus,	Spe.	B—774
Chas. G. Curtis Co.,	Calicoon, N. Y.,	......	B—773
Westmoreland County.			
Joseph Thomas,,	Greensburg,	½	B—710
P. Oldephonse,	Beatty,	8	B—877
Wyoming County.			
*Wm. Lutes, R. D. No. 5,	Tunkhannock,	3½	B—851
*H. S. Hitchcock,	Laceyville,	½	B—735
*W. E. Shoemaker,	Laceyville,	4	B—738
Eugene Underhill (Nursery at Spring Hill, Bradford Co.), 1904 Chestnut St., Philadelphia,	Philadelphia,	2	B—729
*F. A. Fassett,	Meshoppen,	1½	B—730
*G. A. Miles,	Laceyville,	1	B—736
York County.			
W. J. Blocher,	Hanover,	1	B—691
John B. Hersey,	Stewartstown,	......	B—752
Patterson Nursery Co.,	Stewartstown,	6	B—689
Geo. E. Stein,	East Prospect,	6⅓	B—761
W. S. Newcomer,	Glenrock,	6	B—832
F. E. Cremer,	Hanover,	1	B—751
P. M. Craley,	Red Lion,	½	B—690
D. S. Auchey & Son,	Hanover,	1	B—751

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*Grow berries or small fruit plants only.

TREE DEALERS

Tree dealers who make a business of buying trees from various sources and selling them again must file with this office a statement of the nurseries from which they expect to obtain their stock. We then learn if these nurseries are inspected and licensed in their respective states, and if so the dealer is granted a certificate authorizing him to sell and ship such inspected nursery stock in this State, provided it is fumigated before being sent into Pennsylvania.

The following is a list of Pennsylvania tree dealers and agents licensed to sell in this State during the year ending December 31, 1915. It does not include regular nursery agents who represent a single firm, but is a list of tree dealers, as defined above:

		No. of certificate.
Allegheny County.		
Duquesne Tree and Shrubbery Co.,	Pittsburgh,	853
John Bader Co.,	Pittsburgh,	947
H. M. Devereaux, 103 Ohio St.,	Avalon,	876
W. B. Bockstose,	Castle Shannon,	945
L. F. Miller, 1923 Gerret St.,	Pittsburgh,	882
E. S. Hauser,	Emsworth,	922
Charles Honess & Son, 539 Forest Ave.,	Bellevue,	919
J. F. Zimmerman, 6624 Penn Ave.,	Pittsburgh,	917
Mark E. Head, 230 Rodgers Ave.,	Bellevue,	908
Kauffman Bros., Dept. Stores, Inc.,	Pittsburgh,	845
Jos. Horne & Co.,	Pittsburgh,	865
A. W. Graper, Brandt, Harmony and New Castle line,	Perrysville,	860
A. W. Smith Co., Keenan Building,	Pittsburgh,	840
Campbells,	Pittsburgh,	942
Kauffman & Baer Co.,	Pittsburgh,	837
Pittsburgh Tree and Seed Co., 401-5 Penn Ave.,	Pittsburgh,	927
Igel-Rosenstein Co.,	Pittsburgh,	946
Armstrong County.		
B. E. Long, R. F. D. No. 1,	Dayton,	848
Beaver County.		
J. L. R. Hart,	Beaver Falls,	904
J. C. Withrow,	Vanport,	858
J. H. Gutermuth,	Rochester,	948
A. E. Crouch,	Rochester,	877
Bedford County.		
W. D. Slick,	New Paris,	890
Berks County.		
M. E. Smeltzer, 131 W. Greenwich St.,	Reading,	899
Alfred S. Dreibelbis,	Reading,	895
Howard N. McKinney, R. F. D. No. 1,	Sinking Springs,	910
J. R. K. Wagaman,	Klinesville,	949
Blair County.		
E. J. Whitbred,	Altoona,	903
E. C. Miller,	Lakemont,	925
Bucks County.		
John F. Barclay, R. F. D. No. 2,	Doylestown,	888
Quakertown Plant Co., C. E. Bartholomew, Proprietor,	Quakertown,	898

		No. of certificate.
Butler County.		
W. C. Riddle,	Slippery Rock,	909
Geo. W. Raine,	Evans City,	896
Carbon County.		
Paul Niehoff,	Lehighton;	943
Chester County.		
John Alcorn,	Malvern,	915
Clearfield County.		
Wm. G. Jones,	Du Bois,	926
Clinton County.		
W. W. Richie,	Lock Haven,	906
Crawford County.		
J. A. Knapp,	Meadville,	905
B. D. Maynard, 720 Grant St.,	Meadville,	869
J. C. Boyd,	Guy's Mills,	870
A. B. Greenfield & Sons,	Conneautville,	844
Cumberland County.		
Ira E. Bigler,	Camp Hill,	911
D. C. Rupp,	Shiremanstown,	941
Towser & Son,	Carlisle,	912
D. F. Haskell,	Carlisle,	842
Dauphin County.		
A. H. Shreiner, 208 N. 14th St.,	Harrisburg,	866
Geo. F. Greenawalt,	Hummelstown,	939
T. A. Woods, 919 N. 6th St.,	Harrisburg,	920
J. R. Snavly, 125 Liberty St.,	Harrisburg,	886
Holmes Seed Co.,	Harrisburg,	863
Erie County.		
Wm. Keefe & Son, 409 French St.,	Erie,	892
C. J. Roberts,	Albion,	861
H. C. Pettis,	Platea,	842
C. F. Amidon,	North East,	868
Lakeside Co.,	Girard,	883
Franklin County.		
J. Ely,	Waynesboro,	907
Lackawanna County.		
Giles L. Clark,	Scranton,	872
A. J. Noble, 723 Columbia Ave.,	Scranton,	944
F. E. Butler,	Dunmore,	929
Lancaster County.		
Amos D. Herr, 510 W. Orange St.,	Lancaster,	871
Daniel G. Engle,	Marietta,	855
Lebanon County.		
Samuel P. Moyer,	Myerstown,	924
Lehigh County.		
Samuel I. Leh,	Allentown,	928
Luzerne County.		
J. D. Anderson & Son,	Laketon,	873

		No. of certificate.
Lycoming County.		
Evenden Bros.,	Williamsport,	951
McKean County.		
F. S. Palmer,	Bradford,	902
Monroe County.		
B. P. Smiley, 311 N. 8th St.,	Stroudsburg,	856
Harvey Eilenberger,	E. Stroudsburg,	916
Montgomery County.		
The Property Owners' Improvement Co.,	Penllyn,	......
Wm. H. Heistand,	Pottstown,	884
Northumberland County.		
H. F. Frank,	Montandon,	940
L. W. Foust,	Milton,	930
Philadelphia County.		
Strawbridge & Clothier,	Philadelphia,	864
Moore Seed Co.,	Philadelphia,	849
J. R. Giffen, 5341 Webster St.,	Philadelphia,	880
Henry F. Michel Co.,	Philadelphia,	854
Wm. Henry Maule, Inc.,	Philadelphia,	847
Johnson Seed Co., 217 Market St.,	Philadelphia,	846
Hosea Waterer, 107 S. 7th St.,	Philadelphia,	889
Lit Bros.,	Philadelphia,	850
John Wanamaker,	Philadelphia,	851
Gimbel Bros, Inc.,	Philadelphia,	867
Philadelphia Nursery Co., 1320 E. 52nd St.,	Philadelphia,	918
Schuylkill County.		
W. O. Snyder,	Minersville,	914
Snyder County.		
C. E. Walter,	Middleburg,	893
Somerset County.		
John Young,	Windber,	921
Tioga County.		
E. H. Wheaton,	Knoxville,	913
Arthur Edwards,	Elkland,	891
Union County.		
J. G. Oberdorf, R. F. D. No. 2,	Mifflinburg,	900
Venango County.		
Bell Floral Co.,	Franklin,	875
Washington County.		
Frank C. Honess, R. F. D. No. 3,	McDonald,	950
Wyoming County.		
E. A. Ney,	Eatonville,	874
York County.		
E. J. Weiser, R. D. No. 11,	York,	897
Ohio.		
C. E. Vernon & Co., 828 N. Main St.,	Dayton, Ohio,	879
Myers Bros. & Co.,	Wilmot, Stark Co.,	859
Jones & Kurdelmyer,	Troy, Miami Co., Ohio,	923

NURSERYMEN FROM OTHER STATES WHO HAVE FILED AFFIDAVITS OF FUMIGATION WITH THIS DEPARTMENT, VALID TO NOVEMBER 11, 1915.

Alabama.

Chase Nursery Co.,	Chase
Frazer Nursery Co.,	Huntsville
Huntsville Wholesale Nurseries,	Huntsville
Oak Lawn Nursery, A. W. Newson, Mgr.,	Huntsville
Sugg & Syler Nursery Co.,	Meridianville

Connecticut.

Barnes Bros. Nursery Co.,	Yalesville
Burr Nurseries, C. R. Burr, Mgr.,	Manchester
Heath & Co.,	Manchester
Stephen Hoyts Sons Co.,	New Canaan

Delaware.

Bunting Nurseries, C. A. Bunting,	Selbyville
Delaware Nurseries, D. S. Collins, Mgr.,	Milford
Dover Nurseries, Jackson & Raymond, Props.,	Dover
D. S. Myer & Son,	Bridgeville

Florida.

Friffing, C. M. & Co.,	Jacksonville

Georgia.

P. J. Berckmanus Co., Fruitland Nurseries,	Augusta
Otto Katzenstein & Co.,	Atlanta
A. C. Oelschig & Sons,	Savannah

Illinois.

W. W. Barnard Co., The, 161 E. Kinzie St.,	Chicago
Arthur Bryant & Son,	Princeton
Robert Douglas' Sons,	Waukegan
D. Hill Nursery Co.,	Dundee
Swain Nelson & Sons Co., 941 Marquette Building,	Chicago
Peterson Nursery, 108 La Salle St.,	Chicago
Vaughan's Seed Store, 84 Randolph St.,	Chicago

Indiana.

H. B. Beckner,	Greenfield
C. M. Hobbs & Sons,	Bridgeport
H. M. Simpson & Sons,	Vincennes

Iowa.

Mount Arbor Nurseries, E. S. Welch, Prop.,	Shenandoah
The Gardner Nursery Co.,	Osage
D. S. Lake,	Shenandoah
Galloway Bros. & Co.,	Waterloo

Kansas.

The Winfield Nursries,	Winfield

Kentucky.

The Donaldson Co., Willadean Nursery,	Sparta

Maryland.

The Franklin Davis Nursery Co.,	Baltimore
Fleming and Hetzer (The Mountain View Nursery Co.),	Williamsport
Grier Bros,	Forest Hill
J. G. Harrison & Sons,	Berlin
J. E. Stoner, Westminster Nurseries,	Westminster

Massachusetts.

J. W. Adams Nursery Co.,	Springfield
The Bay State Nurseries, W. H. Wyman, Prop.,	North Abington
W. F. Cobb Co.,	Franklin
Eastern Nurseries, H. S. Dawson, Mgr.,	Hollister
Framingham Nurseries, W. H. Wyman, Prop,	North Abington
New England Nurseries, The,	Bedford
The Reading Nurseries, J. Woodward Manning,	Reading
The Floramead Nursery, J. Woodward Manning,	North Wilmington
Old Colony Nurseries,	Plymouth

Michigan.

The Greening Nursery Co.,	Monroe
Kalamazoo Nurseries,	Kalamazoo
I. E. Ilgenfritz Sons Co.,	Monroe
Michigan Nursery Co.,	Monroe
St. Joseph Nursery, The,	St. Joseph

Missouri.

Stark Bros., Nurseries & Orchards Co.,	Louisiana
Wild Bros., Nursery Co.,	Sarcoxie
W. P. Stark Nurseries,	Neosho
New Haven Nurseries,	New Haven

Nebraska.

German Nurseries, Carl Sonderegger, Prop.,	Beatrice
Plumfield Nurseries,	Freemont

New Hampshire.

Ellsworth, Brown & Co.,	Seabrook

New Jersey.

Sam'l C. DeCou,	Moorestown
Wm. F. Basset Nurseries, The,	Hammonton
Jos. H. Black Son & Co.,	Highstown
Bobbink & Atkins,	Rutherford
Arthur J. Collins,	Riverton
Henry A. Dreer,	Riverton
Elizabeth Nursery Co.,	Elizabeth
F. & F. Nurseries,	Springfield
Peter Henderson & Co., (Office 35 Cortland St., N. Y.),	Jersey City
J. T. Lovett,	Little Silver
North Jersey Nurseries,	Milburn
C. Ribsam,	Trenton
Geo. A. Schultz,	Jamesburg
T. E. Steele,	Palmyra
West Jersey Nurseries, Stanton B. Cole, Prop.,	Bridgeton
Geo. A. Steele,	Eatontown
Enterprise Nursery Co.,	Newtonsville

New York.

Allen Nursery Co.,	Rochester
Leon C. Allyn,	Rochester
Arcadia Rose Co.,	Newark
Edward Bacon,	Dansville
Nelson Bogue,	Batavia
Brown Bros. Co.,	Rochester
F. W. Brow Nursery Co.,	Rose Hill
Central New York Nurseries,	Geneva
John Charlton & Sons,	Rochester
Charlton Nursery Co.,	Rochester
Chase Bros. Nursery Co.,	Rochester
Charles H. Chase,	Rochester
Chase Nurseries,	Geneva
John Lewis Childs,	Floral Park
Charles J. Chism,	Rochester
Clark Nursery Co.,	Waterloo
Gilbert Costich,	Rochester
Sepharine Costich,	Irondequoit
Denton, William & Denton,	Dansville
Ellwanger Barry,	Rochester
Dansville Fruit Tree Co.,	Dansville
W. & F. Cass,	Geneva
Samuel F. Burns,	Alton
Edgar Empie,	Sharon Springs
Emmons & Co.,	Newark
Empire State Nursery Co.,	Waterloo
Lawrence J. Farmer,	Pulaski
Fairview Nurseries, The,	Rochester
Finn's Wholesale Nurseries,	Dansville
First National Nurseries,	Rochester
Fruit Growers' Nurseries,	Newark
P. J. Gaughan,	Dansville
Glen Bros., Inc.,	Rochester
Graham Nursery Co.,	Rochester
Orville D. Green,	Syracuse

Greens Nursery Co.,	Rochester
R. B. Griffith,	Fredonia
F. E. Grover & Co.,	Rochester
L. W. Hall & Co.,	Rochester
M. H. Harmon Co., The,	Geneva
Hawks Nursery Co.,	Rochester
D. H. Henry,	Geneva
Henry P. Hill,	Penfield
Hooker Bros.,	Rochester
Home Nursery Co.,	Rome
Home Planter's Association,	Rochester
T. S. Hubbard Co.,	Fredonia
Jackson & Perkins Co.,	Newark
Josseyln Nursery Co., The,	Fredonia
H. M. Kelliher & Son,	Geneva
Kelly Bros.,	Dansville
King Bros.,	Dansville
Knight & Bostwick,	Newark
La Pointe Nursery Co.,	Geneva
Maloney Bros. & Wells,	Dansville
P. McDonnell & Son,	Geneva
Maney & Sayre,	Geneva
H. E. Merrill Nursery Co.,	Geneva
E. Moody & Sons,	Lockport
W. C. Moore & Co.,	Newark
J. B. Morey Nurseries, The,	Dansville
Orleans Nurseries Co., The,	Fort Plain
Pan-American Nurseries,	Rochester
Robt. J. Peck,	Penn Yan
Perry Nursery Co.,	Rochester
Pomona Ten Cent Nurseries,	Dansville
Protective Nurseries, The,	Geneva
Quaker Hill Nursery Co.,	Newark
Alton E. Randall,	Dansville
F. Augustus Reddy,	Rochester
Reilly Bros.,	Dansville
Wm. J. Reilly,	Danvills
Rice Bros. Co.,	Geneva
T. W. Rice,	Geneva
H. W. Rice & Co.,	Buffalo
Richland Nurseries,	Rochester
Lewis Roesch,	Fredonia
W. P. Rupert & Son,	Seneca
W. H. Salter,	Rochester
F. E. Schifferli,	Fredonia
Thos. E. Sheerin,	Dansville
Sheerins Wholesale Nurseries,	Dansville
Elmer Sherwood,	Odessa
W. & T. Smith Co.,	Geneva
Smith Bros. Seed Co.,	Auburn
Geo. C. Stone,	Dansville
C. W. Stuart & Co.,	Newark
Geo. A. Sweet Nursery Co., The,	Dansville
H. S. Taylor & Co.,	Rochester
Geo. Trautman, Jr.,	Geneva
Universal Nurseries,	Geneva
Jas. Vicks Sons,	Rochester
W. S. Waldo Nursery Co.,	Rochester
F. W. Wells Wholesale Nurseries,	Dansville
Western New York Nursery Co.,	Rochester
Wheelock & Congdon,	North Collins
Geo. A. Wickham,	Stanley
Millers Oramental Nurseries,	Ripley
Howe-Campbell Nursery Co., Inc.,	Rochester
C. H. Weeks Co., Inc.,	Lyons
John Watson,	Newark
Remington-Welch Co., The,	Geneva
Williams Co., The Ira,	Jamestown
H. S. Wiley & Sons,	Cayuga
Allen L. Wood,	Rochester
E. M. Wright,	Geneva

North Carolina.

Valdesian Nurseries, Geo. W. Jones, Mgr.,	Bostic
Biltmore Nursery, C. D. Beadle, Mgr.	
J. Van Lindley Nursery Co.,	Pomona

Ohio.

H. C. Allen,	Geneva
H. C. Allen (Woodbine Nursery),	Geneva
American Rose and Plant Co.,	Springfield
Baird & Hall,	Troy
A. Barnes & Son,	Mt. Healthy
M. Barnes & Co., Station K,	Cincinnati
A. F. Bernard,	Painesville
Peter Bohlender & Sons,	Tippecanoe City
Noah Buechley,	Clayton
Mrs. E. N, Call,	Perry
Mrs. S. W. Call,	Perry
H. J. Champion & Son,	Perry
W. B. Cole,	Painesville
Cope Bros.,	Salm
Crest Nursery,	Piqua
Fairmount Nursery Co.,	Tory
Charles Ernst,	Eaton
Farmers' Nursery Co., The,	Troy
Freemont Nursery Co.,	Freemont
Ford Seed Co.,	Ravenna
The French Nursery,	Clyde
R. A. Hacker,	Painesville
W. W. Joiner & Sons,	Perry
Henry J. Kohankie & Son,	Painesville
Martin Kohankie,	Painesville
A. D. Merriman,	Perry
Miami Valley Nurseries,	Tippecanoe City
W. T. Mitchell & Sons,	Beverly
W. L. Musselman,	New Carlisle
T. R. Norman,	Painesville
A. R. Pickett (Clyde Nursery),	Clyde
Geo. H. Poe,	Kenton
Progress Nursery, The,	Troy
M. O. Ressler,	Lima
W. N. Scarff,	New Carlisle
Schmidt & Botley Co., The,	Springfield
Storrs Harrison Co., The,	Painesville
Wagner Park Nursery Co., The,	Sidney
T. B. West,	Perry
Wetzell Bros.,	Painesville
Henry Wurst,	Elyria
Xenia Star Nurseries,	Xenia

Rhode Island.

Daniel A. Clarke,	Fiskville

Tennessee.

J. C. Hale Nursery Co., The,	Winchester
Southern Nursery Co.,	Winchester
Forest Nursery & Seed Co.,	McMinnville

Wisconsin.

Evergreen Nursery Co.,	Sturgeon Bay

(5) INSPECTIONS OF IMPORTATIONS.

One of the most important duties of this office has been the inspection of imported nursery stock, because of the great danger of the Gipsy moth, the Brown-tail moth, and a number of other very seriously injurious insects, as well as numerous plant diseases. In connection with the Federal Horticultural Board men have been sent to follow up every importation of trees coming into this State from abroad. A detailed report of the number of importations and plants inspected follows:

Country	Number of Packages.	Number of Plants.
France,	339	1,576,351
Holland,	4,001	733,545
Belgium,	1,892	114,928
Japan,	123	18,384
England,	122	192,227
Germany,	46	27,344
Ireland,	41	48,697
Scotland,	4	6,006
Trinidad,	12	7,576
Italy,	6	2,135
Brazil,	1	500
Bogota,	6	240
Bermuda,	6	12
Denmark,	1	50
Luxemburg,	1	198
Total,	6,691	2,728,193

(6) APIARY INSPECTION

Beginning with the first of June of this year we had, for the first time, at least, a fair amount of money available to start the Apiary Inspection service. The bee-keeping industry of Pennyslvania is much more important that is generally believed. There is more than one million dollars worth of honey annually produced in this State. We can name several persons who produce more than one thousand dollars worth of honey each year. The value of bees kept in this State is more than one million dollars, and the value of the bee fixtures and accessories is fully as much. In addition to this millions of dollars worth of money goes to waste as ungathered nectar in blossoms, because there are not bees to get it. The honey produced is a clear gain in adding to our agricultural wealth. However, it was found that bees were diseased by two diseases that were more sure of destroying them than would be the Asiatic cholera and small pox in a city of human beings. These diseases can only be determined by one who is more or less familiar with them. What is more remarkable is that by the proper kind of treatment of the bees, and the destruction of the honey they have stored, which is the sole means of carrying the disease germs, they can be cured of these destructive diseases, and be built up to become useful colonies of bees. Thus is can be seen that there is nothing to which the State can devote a fair appropriation that would be more sure to yield good returns than the Apiary Inspection service.

The State of Pennsylvania was unusually fortunate in being able to obtain the services of Mr. Geo. H. Rea, of Reynoldsville, Jefferson county, who is not only a bee-keeper of many years experience, having handled one thousand colonies during one year when he was making this his specialty, but he is also a keen student of the subject, and a gentleman with a knack of getting along well with others.

He is especially adapted for the position of Chief Field Apiary Inspector. Other apiary inspectors are also well qualified, and have recently entered the service of the State. These are Mr. John O. Buseman, of Philadelphia; Mr. Franklin G. Fox, of Pipersville, Bucks county; and Mr. J. R. Rambo, of Collingsdale, Delaware county. As the appropriation for this service is but five thousand dollars for two years, not a great deal can be done, and yet it is surprising that on this limited fund such results were accomplished as are shown below. The report of Mr. Rea, as Chief Apiary Inspector, follows:

REPORT OF PENNSYLVANIA APIARY INSPECTION

AUTHORS' NOTE

The aim of this report is to make a history, to date, of the Apiary Inspection work in Pennsylvania. In order to make it as complete as possible, many details are recorded that would not otherwise be necessary.

To be true to the purpose of the report, statements concerning all legislation relative to the work are given. While some effort was put forth in this direction previously to 1909, yet nothing definite was accomplished until the legislative session of that year.

For the successful passage of our splendid Apiary Inspection law and securing of subsequent appropriations for the work, credit must be given to Economic Zoologist, H. A. Surface and certain members of the Pennsylvania Beekeepers Association. These results are due to their untiring efforts in this direction.

If some beekeeper, discouraged or disheartened because of the ravages of foul brood among his bees, will, by a perusal of these pages, take courage and fall into the ranks of those who are successfully fighting this dread scourge of beekeeping, those who have so faithfully stood by the cause will feel amply repaid for their efforts.

GEORGE H. REA,
In charge of Apiary Inspection.

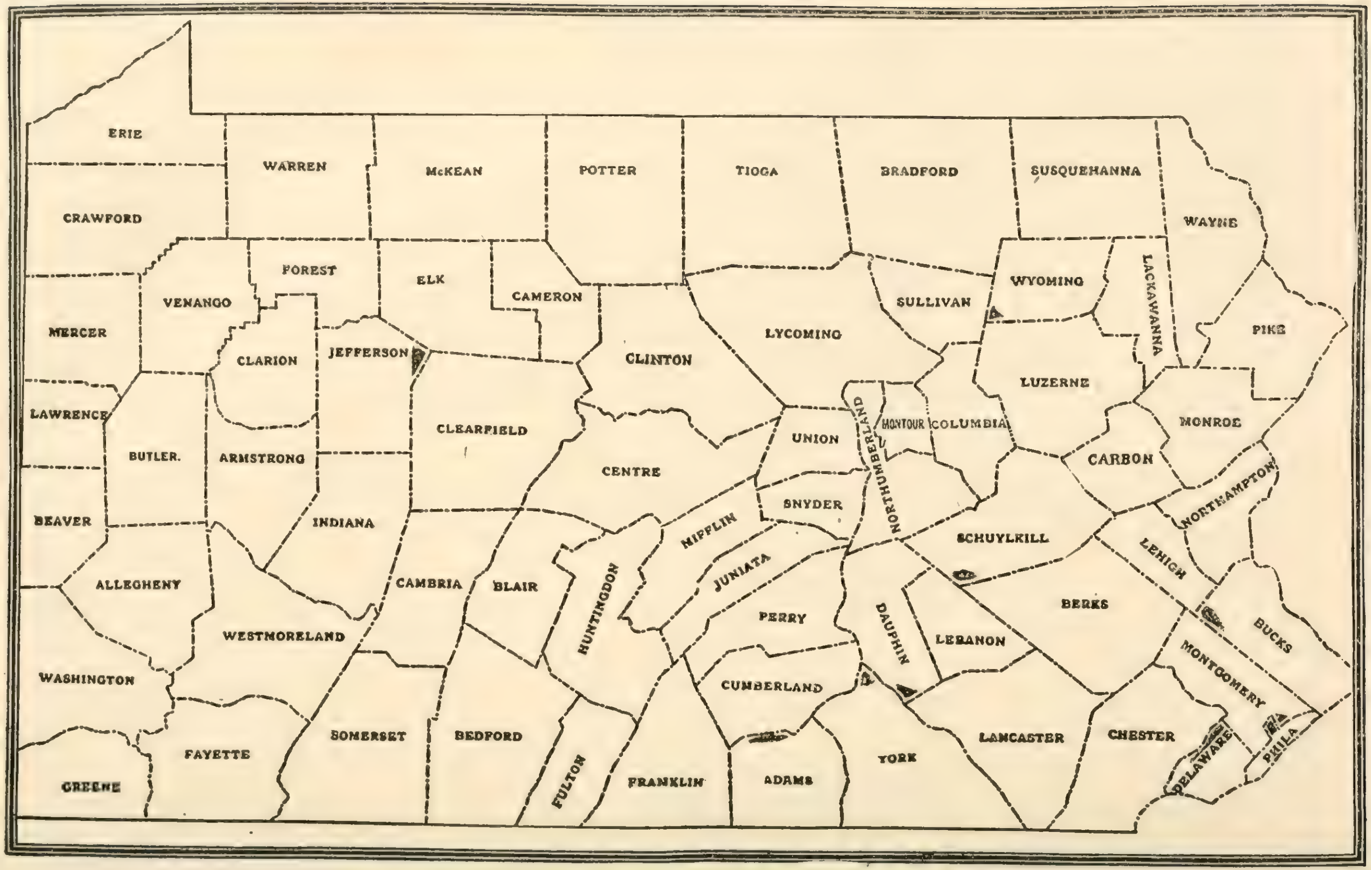
A bill "To provide for the inspection of apiaries, and for the suppression of contagious or infectious diseases among bees, and making appropriation therefor," was introduced in the legislature of 1909. It failed to pass, largely because of a lack of enthusiastic support on the part of the beekeepers. Such legislation was a new thing to most members of the legislature and aroused considerable comment and discussion. It also furnished the basis for ridicule on the part of certain editors of newspapers. However, in these respects we were no more unfortunate than many other states that eventually succeeded in securing such legislation.

Definite results were accomplished in the legislative session of 1911. An act was passed authorizing the Secretary of Agriculture to do the work through the Economic Zoologist. A wave of enthusiasm spread among the beekeepers of the State. However, a murmur of regret followed when it was learned that the legislature failed to appropriate funds for the purpose. A splendid apiary inspection law existed, but no money was provided with which to carry out its provisions.

Many of the best beekeepers of the State were keenly disappointed. At that time European foul brood was especially bad in several counties, and reports show that American foul brood was scarcely less prevalent. The situation was alarming to those who knew conditions best. Later investigations have proven that in the seasons of 1911 and 1912, fully 90% of all the bees, in certain infected areas, were lost by the ravages of these diseases. Had the proper funds been appropriated at that time, thousands of dollars worth of bees and apiary fixtures might have been saved. Many beekeepers knew that something was wrong with their bees and that they were dying rapidly, but did not know the cause. The demands for help constantly increased, but no funds were available to employ persons who were familiar with bee diseases to make inspections.

To meet the emergency, in the spring of 1912, Economic Zoologist H. A. Surface asked for names of those who would volunteer their services. Several beekeepers in various parts of the State responded. Those appointed had successfully passed an examination in beekeeping, at Lancaster, on December 1, 1911. This examination was given by Prof. Surface in connection with the Annual Meeting of the Pennsylvania State Beekeepers' Association. These voluntary inspectors received not one cent for their time, expenses or services.

For a further account of the voluntary inspection work, see Zoological Bulletin, Vol. III, No. 2, March, 1913. The following table, taken from that bulletin, gives the work done by these volunteer inspectors. The map shows approximately the territory covered by them in 1912.



Map 1. Foul Brood. Area of Disease in 1912.

County.	Inspector.	Number of colonies inspected.	Number of apiaries inspected.	Number of apiaries found infested.	*Kind of disease.	*Other Pests Found.
Adams,	Wm. Watson,	12	2	0		
Bucks,	F. G. Fox,	104	7	1	American Foul-Brood (1),	Pickle Brood (1). Wax Moth (2).
Dauphin,	Rev. Calvin Fassold,	78	10	0		Pickle Brood (2). Wax Moth (6).
Delaware,	Penn G. Snyder,	303	52	2	American Foul-Brood (1), European Foul-Brood (1),	Wax Moth (4).
Jefferson,	Goo. H. Rea,	184	14	5	American Foul-Brood (4), European Foul-Brood (1),	Wax Moth (1).
Montgomery,	Wm. A. Selser,	8	1	0		
Philadelphia,	John O. Buseman, Wm. A. Selser,	941	49	6	American Foul-Brood (6),	Pickle Brood (2). Wax Moth (13).
Schuylkill,	J. C. Fassold, D. C. Gilham,	96	10	3	European Foul-Brood (3),	Wax Moth (1).
Wyoming,	Isaac F. Tillinghast,	63	5	1	European Foul-Brood (1),	Wax Moth (2).
York,	Wm. Watson,	68	7	0		
Totals,		1,856	157	18		

*The figures in parentheses indicate the number of apiaries thus found infested.

The Legislature of 1913 appropriated $5,000.00 for apiary inspection for two years. Because of a shortage of State funds the amount was later cut to $1,000, or only five hundred dollars per year. Apiary inspection was then an assured fact in Pennsylvania beekeeping.

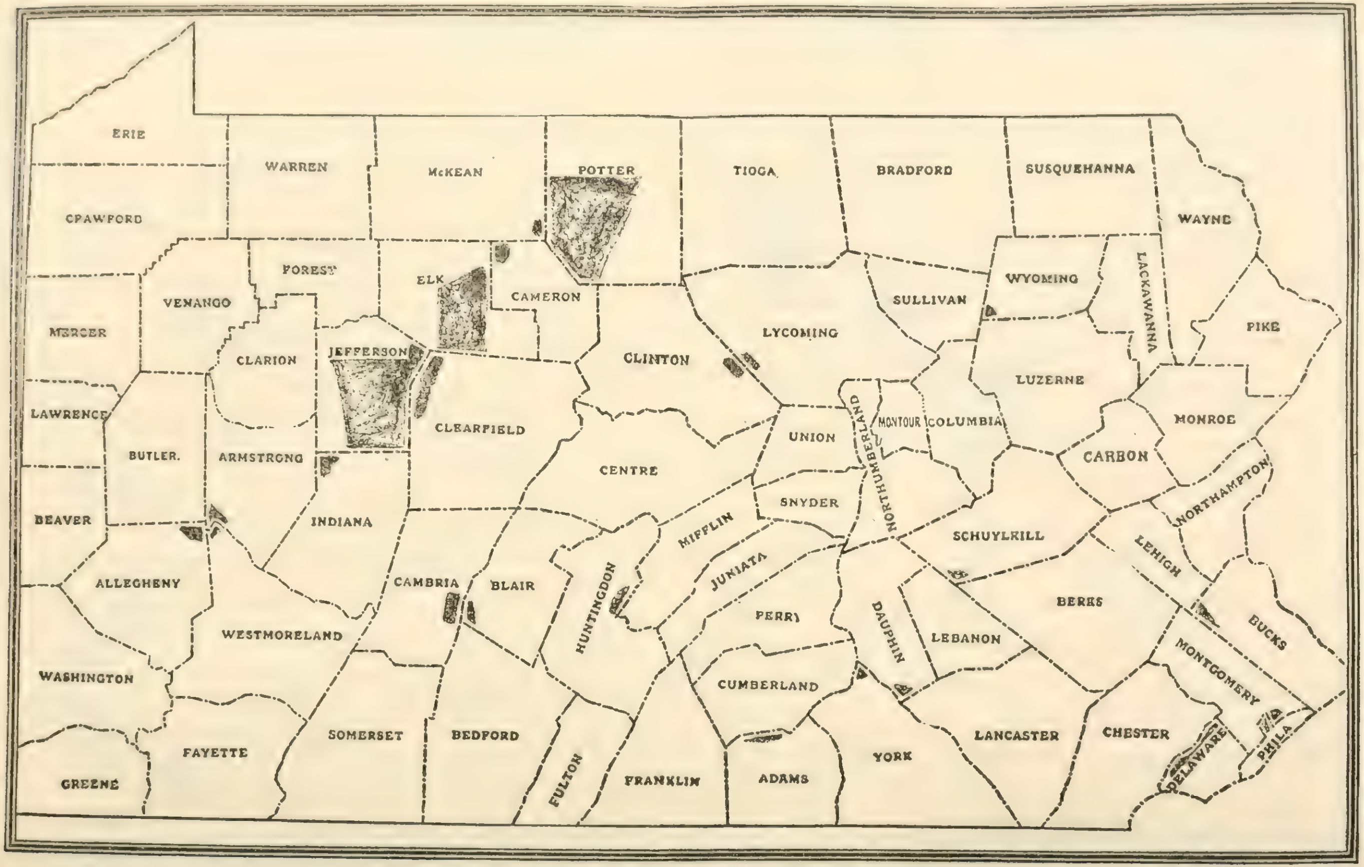
In 1913 and 1914 the work was pushed in the best manner possible, consistent with the limited funds. As many foul brood infected areas in as many counties as possible were investigated, and help given. Thorough inspection of the bees in each area visited was not possible without using the funds too much in one place. Neither was a second visit possible, with a few exceptions. The wisdom of the policy of making a small appropriation do the most good for the greatest number of beekeepers may be seen by a perusal of this report and consideration of the results obtained.

Practical instruction for treating diseased bees were given. In some cases badly infected colonies were burned. Old moth-eaten combs on which bees had died, were either burned or instructions given how to melt them and make wax. Old box hives and rubbish about the apiaries were ordered burned. In general, a "clean up" campaign was waged. In all cases the co-operation and fellowship of the beekeeper was sought, and usually won. This is an important point in all inspection work. Instructions in modern methods of beekeeping were given.

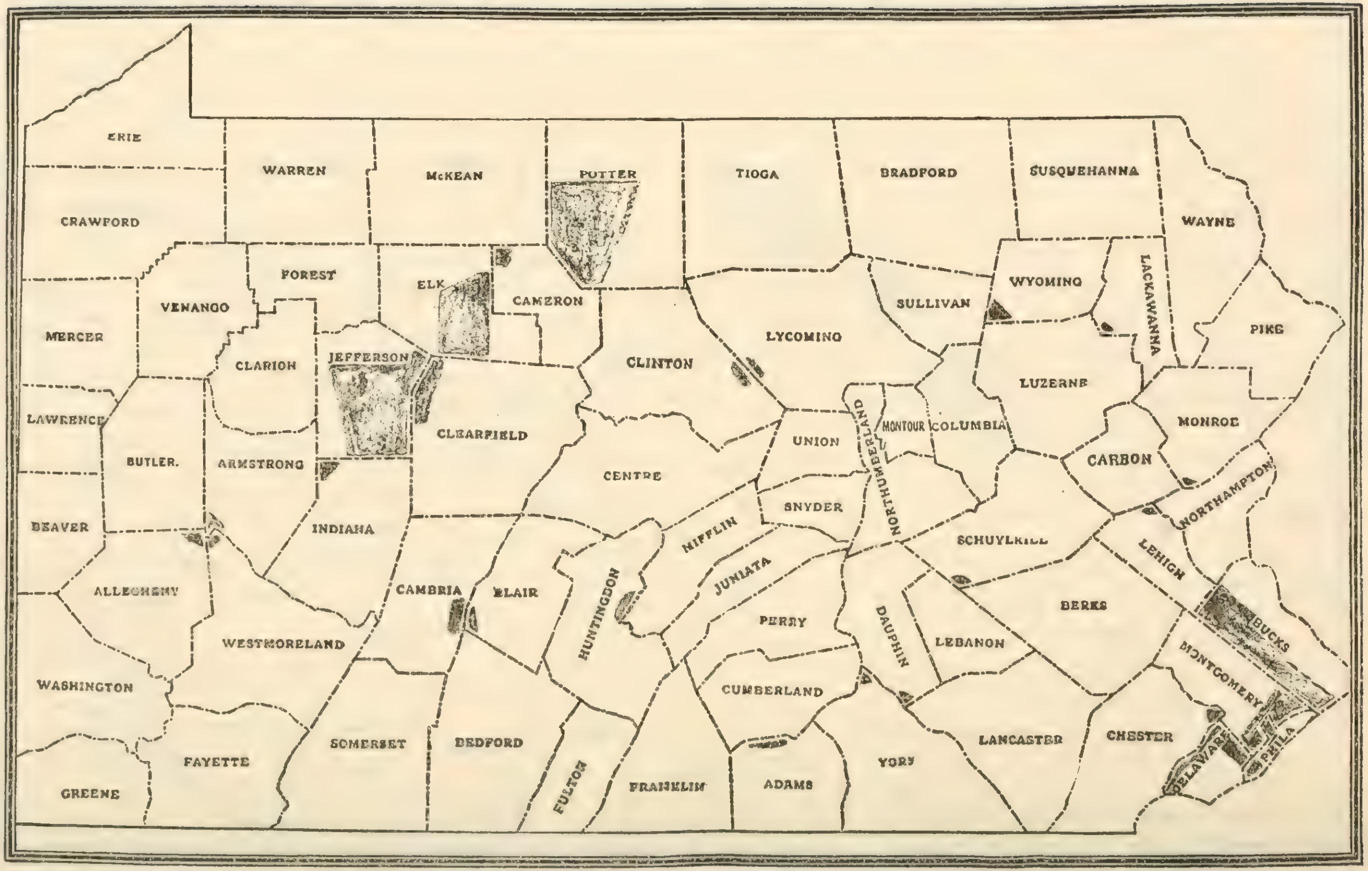
Where possible to do so without extra expense, demonstrations were made. In one notable instance, in a badly infected area, an apiary of more than thirty colonies, with the exception of three, had died with American foul brood. This yard had been neglected by the owner, because of sickness and old age, and undoubtedly was the source of infection for the bees of that neighborhood. Two of the living colonies were taken and treated by a neighbor. A huge bonfire was made of the whole thing, including the one remaining and nearly dead colony. A small gathering of beekeepers were present with a press reporter and a photographer.

In many places beekeepers were shown how to transfer their bees from the old boxes to modern hives and were shown the manipulations necessary for the proper treating of diseased bees.

The decided advantage of beekeepers co-operating in the fight with foul brood was demonstrated in one town. Practically every apiary in the vicinity was found to be diseased with American foul brood. The beekeepers employed one of their number, who knew how, to take the lead. They all helped. A "Bee-Shaking bee" was made of it. Going from one yard to another, in rapid succession, they shook all the diseased colonies in several yards in one day, and did a good job of it. In some apiaries that meant every colony in them. Some cases recurred, yet but little disease showed up the next summer. These were promptly cared for by the beekeepers without State help. This plan was carried out at the suggestion of the inspector who visited that area in 1913. One man failed to follow instructions. Fortunately for other beekeepers he was isolated several miles. He had lost about two hundred colonies with American foul brood in 1911 and 1912. At the time that his yard was inspected in 1913 he had but forty-five badly infected colonies left. These he failed to treat as instructed. His bees are all now dead but two that will hardly live over winter. Fortunately there are very few who are as careless and indifferent as he.



MAP 2. FOUL BROOD. Area of Disease in 1913.



MAP 3. FOUL BROOD. Area of Disease in 1914.

In contrast to the case cited above, another man had, in 1913, thirty colonies infected with American Foul Brood in a yard of forty colonies. He followed the instructions of the Inspector closely for two years. When visited last fall his bees seemed to be entirely free from disease, and a good honey crop had been harvested as well as some increase in colonies made.

Some of these diseased areas were again visited last fall in order to determine the results of the previous work. Many of the beekeepers have learned to be their own inspectors. Most of them had followed instructions with care and enthusiasm. Many apiaries that were infected are now apparently entirely free from disease, as a result of careful instructions on the part of the inspectors and two years vigilance on the part of the beekeepers.

As a result of the inspectors' visits many beekeepers have adopted more modern and scientific methods of beekeeping. Apiaries have been recuperated, and where disease was rampant hardly a case is now to be found. As might be expected some disease still exists in some of these areas. This is especially true of the American Foul Brood districts. It may be possible that with another thorough inspection of these areas, the last vestiges of foul brood may be eradicated.

The work done by the inspectors in 1913 and 1914 is shown in the following tables and maps:

TABLE FOR 1913

County	Inspector	Number of apiaries inspected	Number of colonies inspected	Number of apiaries found infected	Number of colonies found infected with American Foul Brood	Number of colonies found infected with European Foul Brood	Total number of colonies found infected
Allegheny,	Geo H. Rea,	5	48	....	....	....	....
Armstrong,	Geo. H. Rea,	2	5	....	....	....	....
Blair,	Geo. H. Rea,	3	47	....	....	....	....
Cambria,	Geo. H. Rea,	14	483	....	....	....	....
Cameron,	Geo. H. Rea,	2	39	1	....	1	1
Clearfield,	Geo. H. Rea,	52	752	28	103	35	138
Clinton,	Geo. H. Rea,	16	245	7	....	80	80
Delaware,	Penn G. Snyder,	14	163	1	2	....	2
Elk,	Geo. H. Rea,	24	595	16	323	....	323
Huntingdon,	Geo. H. Rea,	4	31	3	21	....	21
Indiana,	Geo. H. Rea,	11	244	6	18	....	18
Jefferson,	Geo. H. Rea,	72	1,117	10	34	2	36
Lycoming,	Geo. H. Rea,	3	36	2	....	5	5
McKean,	Geo. H. Rea,	2	14	2	14	....	14
Potter,	Geo. H. Rea,	30	1,103	18	41	98	139
Westmoreland,	Geo. H. Rea,	2	36	1	....	2	2
Totals,	....	256	4,958	95	556	223	779

TABLE FOR 1914

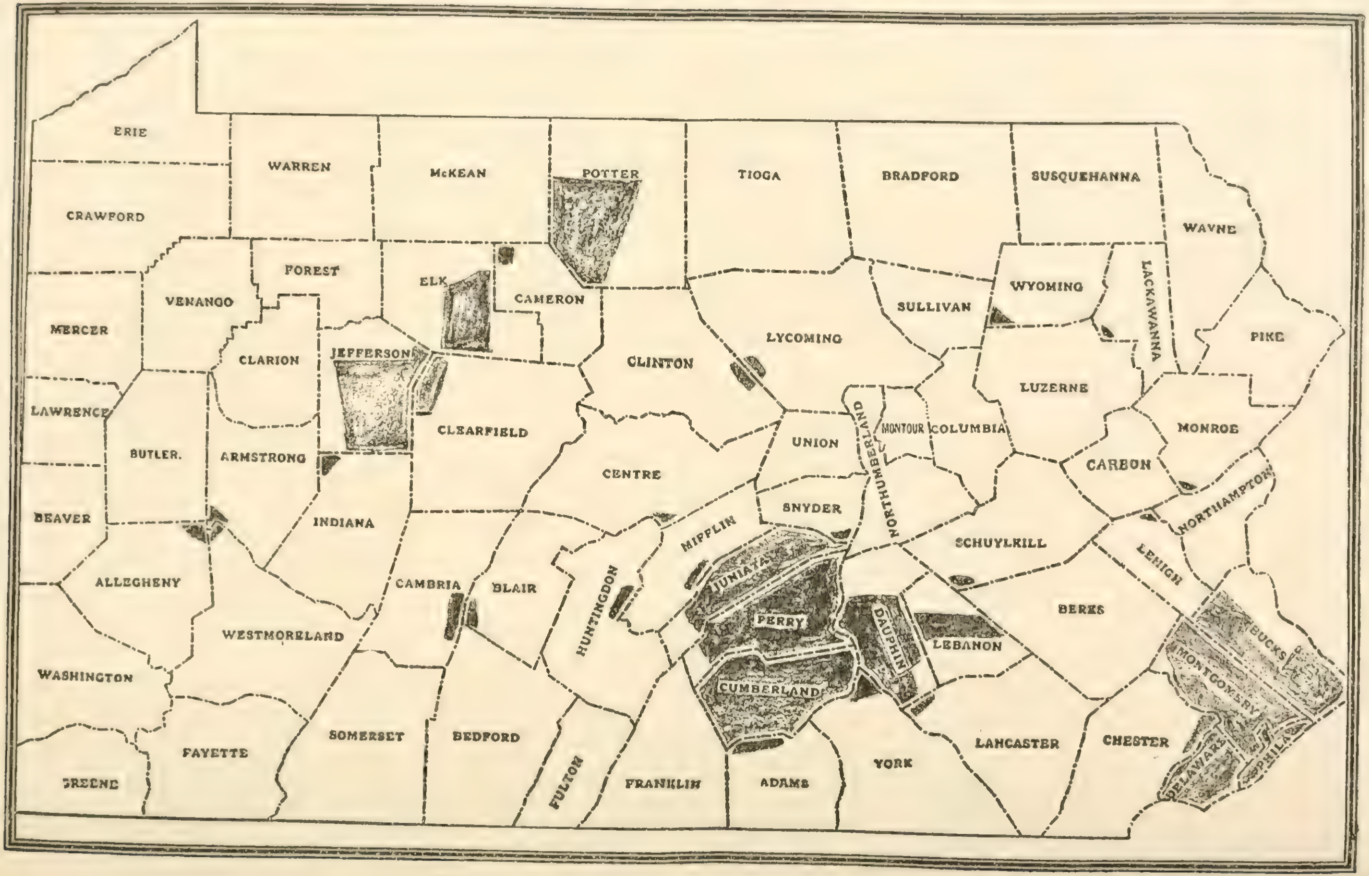
County	Inspector	Number of apiaries inspected	Number of colonies inspected	Number of apiaries found infected	Number of colonies found infected with American Foul Brood	Number of colonies found infected with European Foul Brood	Total number of colonies found infected
Bucks, ...	F. G. Fox, ... John O. Buseman,	109	781	4	4	10	41
Chester, ...	John O. Buseman, ..	7	78	....	....	....	....
Delaware, ...	John O. Buseman, ..	35	489	2	3	....	3
Lackawanna, ...	Isaac F. Tillinghast,	1	6	....	....	....	....
Lehigh, ...	Isaac F. Tillinghast,	1	....	....	....	....	....
Monroe, ...	Isaac F. Tillinghast,	2	....	....	....	....	....
Montgomery, ...	John O. Buseman, ..	35	309	5	8	....	8
Philadelphia, ...	John O. Buseman, ..	182	2,067	5	86	8	94
Wyoming, ...	Isaac F. Tillinghast,	3	189	....	....	....	....
Totals, ...	....	375	3,919	16	101	18	119

At the annual convention of the Pennsylvania State Beekeepers' Association, in Harrisburg, February 20 and 21, 1915, a determined effort was made to secure largely increased appropriations for the next two years work. As a result, $5,000.00 was appropriated for two years, and became available June 1, 1915. While this amount is not nearly sufficient properly to inspect the bees of the State and otherwise give the help that the beekeepers need, yet it is gratifying to know that the appropriation was increased five times over that of 1913.

In starting the inspection service of 1915 a systematic effort was made to inspect as far as possible, every apiary in certain districts. Inspectors J. R. Rambo and John O. Buseman worked in the southeastern corner of the State. The writer made his headquarters at Harrisburg and worked out from there. By this plan Cumberland, Delaware and Philadelphia counties were practically finished, while the larger portions of Bucks, Montgomery, Dauphin, Juniata and Perry counties were inspected. At the same time a good start was made in Lebanon and several other counties where help was needed. A badly infected area, in the eastern end of Juniata county and touching on the southern side of Snyder and the northeastern side of Perry counties, was worked out. The work in this area was continued until cold weather prevented anything more being done.

A beekeeper in Cumberland county suspected foul brood among his bees. He promptly reported it to the Economic Zoologist. Inspection was given at once, and with the co-operation of the beekeeper, every trace of the disease was stamped out. Similar work was done in the southeastern counties, where the foul brood condition is rapidly coming under control, through the efforts of the inspectors.

The territory inspected in 1915 os approximately as great as that of the combined three previous years, and the number of apiaries inspected is likewise greater than that of the previous years. The greater amount of inspection accomplished in 1915 is due, of course,



MAP 4. FOUL BROOD. Area of Disease in 1915.

to the greater appropriation which allowed of more steady employment and continued service to the inspectors. Automobiles used by inspectors are a decided advantage in the work. Many beekeepers are so far from railroad or electric lines that about the only practical way to reach them is by automobile.

This year, as formerly, beekeepers were advised how to transfer their bees from box hives to modern hives, how to feed and how to pack their bees for winter, and various other manipulations in modern beekeeping. Some demontrations were made. At every apiary visited by the inspectors instructions were given how to detect and fight foul brood should it occur among the bees. Aside from the regular inspection of their bees, the beekeepers derive considerable benefit from the visits of the inspectors.

TABLE FOR 1915

County	Inspector	Number of apiaries inspected	Number of colonies inspected	Number of apiaries found infected	Number of colonies found infected with American Foul Brood	Number of colonies found infected with European Foul Brood	Total number colonies found infected	Number of colonies destroyed
Adams,	Geo H. Rea,	1	3	......	......	......	......	......
Blair,	Geo. H. Rea,	1	8	......	......	......	......	......
Bucks,	John O. Buseman,	32	245	......	......	......	......	......
Cambria,	Geo. H. Rea,	4	38	......	......	......	......	......
Center,	Geo. H. Rea,	2	37	......	......	......	......	......
Chester,	John O. Buseman, J. R. Rambo,	12	318	......	......	......	......	......
Clearfield,	Geo. H. Rea,	9	272	......	......	......	......	......
Cumberland,	Geo. H. Rea,	150	1,448	1	5	......	5	......
Dauphin,	Geo. H. Rea,	58	649	......	......	......	......	......
Delaware,	John O. Buseman, J. R. Rambo,	75	996	......	......	......	......	......
Huntingdon,	Geo. H. Rea,	3	53	......	......	......	......	......
Jefferson,	Geo. H. Rea,	29	642	3	8	......	8	......
Juniata,	Geo. H. Rea,	173	1,397	29	18	165	183	132
Lancaster,	Geo. H. Rea,	6	168	......	......	......	......	......
Lebanon,	Geo. H. Rea,	12	194	......	......	......	......	......
Mifflin,	Geo. H. Rea,	10	57	......	......	......	......	......
Montgomery,	John O. Buseman,	113	803	2	4	......	4	2
Perry,	Geo. H. Rea,	121	991	2	......	18	18	4
Philadelphia,	John O. Buseman,	109	898	11	26	12	38	8
Snyder,	Geo. H. Rea,	5	32	2	......	2	2	2
York,	Geo. H. Rea,	8	135	......	......	......	......	......
Totals,		933	9,384	50	61	197	258	148

APIARY INSPECTORS' MILEAGE FOR 1915

Inspector	Miles traveled by automobile	Miles traveled by train or trolley	Miles traveled by horse and buggy	Miles traveled by walking	Total colonies inspected
J. R. Rambo,	150	35	....	[illegible]	313
John O. Buseman,	410	750	26	[illegible]	2,947
Geo. H. Rea,	8,200	250	....	50	6,124
Totals,	8,760	1,035	26	295	9,384

TABLES AND MAPS

The tables are compiled as completely as possible. They vary somewhat in construction, according to the statistics available for each year.

The dark areas on the maps show the relative portion of inspected territory in each county. As nearly as possible the situation of the inspected territory is given. The increase of the inspected areas, from year to year, is notable.

SOME NOTABLE FACTS

Beekeepers should co-operate with the inspectors and follow their instruction closely. Where this has been done foul brood has been brought under control, and the bees saved. Those who neglected to do so have lost their bees.

Many beekeepers have adopted better and more modern methods of beekeeping and are breeding a better race of bees, as a result of the apiary inspection work.

The beekeepers are backing up the apiary inspection work through the Pennsylvania State Beekeepers' Association. Every beekeeper should be a member.

Increased appropriations for the work indicate a rising tide of interest in beekeeping in this State.

Beekeepers can always help this very important industry by keeping their Representatives in the Legislature posted on beekeeping and bee diseases.

(7) BEE DEMONSTRATIONS

As the San José scale proved to be a blessing in disguise, because it forced people to new and better methods of orcharding, so are the diseases known as American Foul Brood and European Foul Brood proving to be of value to the beekeepers of this State, as they are learning that beekeeping is an art based upon fundamental scientific principles, and that there are far better returns and more pleasurable methods in keeping or caring for bees than those of merely keeping them in old box hives or gums. There has been a demand for demonstrations in methods of changing bees from such old hives to modern frame hives, and also for treating bee diseases. These demonstrations have been given at a few places in the State and more are planned during the coming year. This is a specialized line of agriculture which is worthy of the slight effort given it through this Bureau.

(8) COMPULSORY PEST SUPPRESSION

One of the important features of service by the Bureau of Zoology is the compulsory suppression of pests. The law provides that when complaint is made to the Secretary of Agriculture, a representative be sent to inspect the premises supposed to contain pests and to direct the owner to treat them and prescribe a time limit within which said treatment is to be given. After the expiration of this limit, if it has not been done, it becomes our duty to destroy the infested trees or plants, or treat them, and charge the owner for the work as a lien upon his property the same as tax. There have been about twenty cases in this State this year in which it was necessary to undertake such compulsory treatment of pests, and in every case theowner cleaned up the premises that contained pests threatening others, and did this as soon as he found that we were really in earnest and backed by the law. The names of persons making the original complaints were not published, and the owners do not know now through what source the initiative was taken. Even the surrounding neighbors do not know that such treatment was given because of compulsory measures under an act of Legislature, but the desired results were obtained. This is a good law, and is bringing results, and will be made of greater use in this State as the citizens come to further understand its real value.

(9) OTHER PRACTICAL SERVICE IN ECONOMIC ZOOLOGY.

Economic Zoollogy is, of course, much more extensive than its one branch of entomology. It pertains to such subjects as the destruction of obnoxious mammals, birds, rabbits and other animals, and the preservation of beneficial species.

As the effects of the bounty laws in destroying the enemies of rodents become more apparent, the losses by rabbits, mice and rats will become much more conspicuous in this State. From the standpoint of economic zoology we consider it a serious mistake to place a bounty upon such creatures as the weasels, which have their important functions in Nature to perform.

Rodents are becoming so very destructive that one of the chief sources of loss in the increasing number of orchards in this State, is through the damage effected by rabbits and mice during the winter. We have estimated and published that rodents destroy more than five millions of dollars worth of property in this State annually. We have undertaken a campaign against such obnoxious creatures, and have given practical assistance in their extermination.

In our experimental work, we have further proven the value of the lime-sulfur wash applied to the lower branches and trunks of trees to keep rabbits and mice from gnawing them during the winter time. This is effective, non-injurious to the trees and economical. The poisoning and trapping of rats and mice is recommended, and it is particularly urged that in the construction of buildings efforts be made to render them practically proof against mice and rats, and that more concreting be used for the floors of buildings; and the places where rats and mice can find concealment, such as old wood piles and lumber piles, be removed or raised on supports. However, the fundamental means of destroying rodents is to preserve and develop their natural enemies, such as weasels, foxes, especially the gray fox, and hawks and owls. The little screech owl feeds almost entirely upon rats and mice, and is one of the very best friends of the farmer.

ENGLISH SPARROW

There is no greater enemy of the small native birds, such as are commonly found around the abode of mankind, than the English sparrow. This introduced pest not only takes food that would be eaten by poultry and native birds, but actually feeds on the eggs and young of the birds themselves, and also drives away our native birds of song and beauty. We have experimented with killing the English sparrows with poison grain and found it successful. We recommend it as has been published in detail in our bulletins. We also recommend the use of a 22-calibre gun loaded with dust shot. We have before us a letter from a correspondent who says that the native birds soon become accustomed to the slight noise is makes and do not fear it, as they soon learn that they are not molested by it. We also recommend trap nests for the English sparrows. This is one of the best means of catching and destroying them.

THE ENGLISH STARLING

One of the introduced birds, against which we have sounded a warning for the past nine or ten years, is the English Starling. This bird is now becoming so abundant in the eastern part of this State as to be a real nuisance. A large poultryman near Philadelphia recently informed us that the starling is causing him considerable loss by actually striking the hens on the head while they are feeding, and driving them away, and then swooping down on their food and devouring it in a hurry. The starling nests in boxes, and will appropriate the boxes placed for martins and bluebirds. We have described its habits as being intermediate between those of the English sparrow and of the blackbird. It is dark in color marked with brown and some irridescent or metallic gloss. It will soon prove to be beyond control in this State if action is not taken for its destruction. It is not protected by law, and our citizens must not wait until it gets beyond their control. At the present time in the State of Massachusetts there are provisions by which a person observing a starling anywhere can notify state officials, and have a person sent to shoot it at once. It is not advisable for citizens of our Commonwealth to wait for the State to do the actual work of the suppression of these pests. They must take the information which is here given them, and act upon it promptly.

BIRD DAY IN THE SCHOOLS

One of the best steps forward for educating the youth of our country to interest them in birds, and popularize the study of birds and bird preservation, was the establishment of Bird Day as an official feature of public attention in our schools, and very appropriately Bird Day is to be observed in connection with Arbor Day. It is time for a great deal to be done toward the conservation of our wild life,—not only the birds, but also the mammals and other forms of undomesticated creatures. In this connection we have published bulletins and circulars upon making bird boxes and bird preservation.

The last of our Bird Bulletins, which is the last in the series of ten on bird life in Pennsylvania, was published in May, 1914, as Nos. 3 and 4 of Vol. IV of the Bi-Monthly Bulletin of the Bureau of Zoology. This contains a description of birds of several families of the Order Passeres or Perching Birds, together with a discussion of the habits, eggs and nests of each, and also gives special attention to the subject of constructing nesting boxes. We have started a plan of enlisting the co-operation of manual training teachers in building bird boxes in connection with their schools. The most extensive campaign in this State that has ever been undertaken was thus started by this office. Results will doubtless be manifest next year.

In addition to the building of bird boxes we have given special attention to the publication of lists of trees, bushes, shrubs and vines that could be planted to feed the birds. Much can be done along the line of providing food and shelter, and thus inducing them to return to their former surroundings. This is a system of very practical wild life conservation.

CATS SHOULD NOT BE DESERTED.

It is unfortunately the custom of many persons in moving to desert or leave behind the cats. This may be due to the absurdly foolish and superstitous notion that to move the cat brings bad luck. There should be a law in this State making it necessary to kill superfluous cats and leave none behind when moving away from any place. A cat that is left on the premises suffers from starvation, and any person observing this form of cruelty is justified in bringing it to the attention of the Society for the Prevention of Cruelty to Animals. Action should be taken in a very definite and conspicuous manner. A few published examples of prosecution will be good to stop this evil.

A cat that is left behind becomes half wild, and learns to feed upon birds, and becomes one of the most serious menaces of our native bird life. Thus, in preventing the practice of leaving cats behind when moving, we are preserving the birds.

We regret that owing to the lack of office help we are not able to submit a detailed report upon the number of orchard inspections made, the number of trees of each variety inspected, the acreage inspected, the townships in which inspection service was rendered, the pests found, and the remedial measures followed. In our daily reports of inspectors we have very complete statistics as to the actual number of fruit trees of each and every kind in each township and county in the State of Pennsylvania. When the time comes that we have enough office help to compile these statistics as a matter of public information they can easily be obtained and given in a general report. It is to be hoped that sufficient funds for this help, and for other important possible service of this office, will be forthcoming.

Respectfully submitted,

H. A. SURFACE,

Economic Zoologist.

REPORT OF THE BUREAU OF CHEMISTRY FOR THE YEAR 1915

Prof. JAMES W. KELLOGG, *Chief Chemist.*

The work accomplished by the Bureau of Chemistry during the year 1915 has included the chemical analysis and microscopical examinations, clerical and administrative duties necessary in enforceing the provisions of the control laws regulating the sale of Feeding Stuffs, Linseed Oil and Seeds and making preparations for the work necessary in carrying out the provisions of the laws regulating the sale of Paint, Putty and Turpentine, which became effective December 1 and the Lime Law which became operative January 1, 1916.

Because of the greater importance of the Feeding Stuffs industry to the agricultural interests of the State and the amount of funds made available for this work as compared with the inspection of Linseed Oil and Seeds, a larger proportion of the year's work has been devoted to the collection and analysis of Feeding Stuffs. Under the direction of the General Agent, who has charge of the field work, Special Agents visited 293 towns and cities in 50 counties of the State and obtained 1,264 official samples of Feeding Stuffs, representing the various brands of feeds being offered for sale. These samples were placed in bottles and sent to the Bureau of Chemistry for analysis, together with a report covering each sample showing the markings on the sacks or on attached cards. A number of places were visited where no samples were taken for the reason that the brands of feed found being sold were represented by samples secured in other or nearby localities. In addition to securing samples, all shipments of feed and especially those where samples were not taken, were examined by the agents to determine whether or not the law was being complied with in regard to the sacks or attached cards being printed with the required information. In cases where the labeling appeared at all improper, even if a number of samples of the brand represented had been already secured, additional samples were taken and a report made of the method of labeling, amount of feed in stock, etc. Each of the official samples of feeds were carefully analyzed for Moisture, Crude Protein, Crude Fat, Crude Fiber, and examined microscopically to determine whether or not the guarantees and list of ingredients claimed were correct and also to determine whether or not inferior feed by-products or products prohibited by the law from being used were present. The result secured, together with the guarantees, were compared with the information included on registrations on file.

A report including the information submitted by the Special Agents, together with the results of analysis covering each sample, was submitted to the Secretary of Agriculture. Reports were also sent to the dealers from whom each sample was secured and to the manufacturers. Where variations were found to exist, both manufacturers and dealers were immediately notified by remarks on the reports where the variations were of minor importance, and by letter accompanying reports when discrepancies noted warranted special attention. From time to time as reports were made to the Secretary of Agriculture, those in which variations were found to occur, were carefully considered and where guarantees were found to be false or feeds were adulterated, and especially where intent to misrepresent the product was apparent, prosecutions were ordered by the Secretary of Agriculture.

During the year there were 34 prosecutions ordered, 10 of these cases being on samples secured during December, 1911, and reported early in the year, where it was found action was necessary to impress the fact that the requirements of the law should be complied with. After making special investigation in these cases and securing additional information, it was deemed inadvisable to press them all for conviction, and accordingly all but three were adjusted by the magistrates by the payment of costs, but without payment of fine, as the defendants and the manufacturers promised the Department that there would be no further violations. Fines of $50 each were received in the three cases referred to. Of the number of cases ordered, fines of $50 each were paid in 21 cases during the year, amounting to $1,050, which was immediately paid to the State Treasurer as required. Two of the cases ordered are still pending and a few others were adjusted without payment of fines. The violations consisted for the most part of false guarantees for protein, fat and fiber and adulterations with weed seeds. A number of these violations were minor in their character and of such a nature that it was thought inadvisable to take drastic action. Where minor violations occurred, and where no action was taken, the parties responsible were notified and in practically every case showed a willingness to comply with the requirements of the law. A report of the field work shows that all feed dealers are co-operating with the Department in the work and are unanimous in their belief that the enforcement of the law is of great benefit to the trade in bringing the quality of the feed sold in the State to a high standard and protecting consumers from purchasing misbranded and inferior goods.

During the year the number of special samples sent to the Department for analysis was 225. The fees received for the analysis of these samples amounted to $225, which was paid to the State Treasurer, as required. These samples were all analyzed and reports made to the senders as soon as possible after they were received. In a number of cases requests were made for a microscopical examination to determine the presence of adulterants or for the purpose of finding out whether or not the feed in question was in any way damaged or unfit for feeding purposes. Where these requests were received, they were complied with. Receipts for the fees submitted also accompanied each report. The analysis of these special samples has made it possible for a number of purchasers to be reimbursed where it was found in the case of cottonseed meals, the analysis did not meet the guarantees. In many other cases samples were submitted for the purpose of finding out what guarantees should be given where they were to be offered for sale and registered with the Department. The analysis of these special samples, therefore, has been of great assistance to many in making it possible for the proper labeling and guaranteeing of a number of brands of feeds which were to be placed on sale in the State. While the amount of charge does not cover the cost of analysis, it is believed that this provision in the law has been of great assistance, not only to those who wish to properly guarantee their products, but to the Department in carrying out the provisions of the law with respect to labeling.

From time to time as the 1915 feeding stuffs registrations were being received early in the year and where the information contained in these registrations raised the question as to whether or not the character of the samples listed would pass the requirements of the law, a request was made for samples to be submitted for examination. While the number of such samples submitted was not large, the information in these cases resulted in corrections being made, certain products being eliminated and in a few cases registrations being refused until the objectionable features or ingredients were eliminated.

During the year the Bureau co-operated wtih the Feeding Stuffs Officials of other states for the Association of Feed Control Officials in analyzing samples of cottonseed meal. This work was done for the purpose of continuing the work started in 1914 in attempting to arrive at some standard composition for cottonseed meal and especially for a crude fiber standard. The number of these samples of cottonseed meal and also cottonseed analyzed was 50 and were secured from various cottonseed mills located in the South by one partment of Agriculture. The results secured were reported to the of the chemists of the Bureau of Chemistry of the United States De- Committee of the Association of which the Chief Chemist was a member and that committee after carefully considering the results of the two years' work, made a report to the November meeting of the Association held in Washington, that from the information secured on all the samples analyzed, it could not recommend that a standard for crude fiber should be adopted for cottonseed meal. The variation in the composition of the seed from the various localities in the South where it is grown and also from the fact that the samples of meal secured did not fairly represent all brands of meal being produced, made it impossible for a standard for crude fiber to be agreed upon which could be accepted by the officials in all the States. This report, however, will not affect the character of the meals being sold in Pennsylvania, for the reason that the law restricts the content of fiber to 9%. The official samples of meal analyzed during the year show an average fiber content close to this amount.

In addition to the samples of cottonseed meal analyzed in the co-operative work, there were approximately 100 additional samples, including feeding stuffs and a few other products, analyzed for the purpose of securing information for the Bureau as to the composition of certain feed by-products and in co-operation with other chemists in securing check results. A few of these samples were examined in accordance with the direction of the Secretary of Agriculture, and included tests for strychnine in a sample of corn suspected of causing the death of birds and the analysis of a few samples of fertilizing materials

Early in the year it was discovered that a feeding stuffs was being sold in the State for distillers' grains which, upon examination, was found to be not straight dried grains from the distilling processes, which product was selling for $6 to $7 a ton less than straight distillers' dried grains from corn. The product had a composition similar to that of brewers' dried grains analyzing less than distillers' grains from corn and a little more than distillers' grains from rye. In order to thoroughly investigate this matter, the Chief Chemist and General Agent made a trip to the Peekskill plant of the Fleischmann Company where the product was being prepared. They were received very courteously by the company officials and given every opportunity to determine the character of the product. The result of the investigation showed that the grains were a mixture of distillers' dried grains and yeast dried grains; also that a similar product being put out by another plant in the West, were, instead of being distillers' dried grains, the dried grains from the manufacture of yeast without having mixed with this product the distillers' dried grains. This situation was reported to the officials of the Bureau of Chemistry, in Washington, who also made an investigation of this subject with respect to interstate shipments. The co-operative work between this Department and the United States Department resulted in the question being presented at the Fall meeting of the Feed Control O—cials Association, which Association adopted a definition for the product as follows: "Yeast or Vinegar Dried Grains are the properly dried residue from the mixture of cereals, malt and malt sprouts (sometimes cottonseed meal) obtained in the manufacture of yeast or vinegar and consists of corn or corn and rye from which most of the starch has been extracted, together with malt added during the manufacturing process to change the starch to sugar, and malt sprouts (sometimes cottonseed meal) added during the manufacturing process to aid in filtering the residue from the wort and serve as a source of food supply for the yeast." This matter was also taken up directly with the manufacturers who, after considering the subject, complied with a request of the Department, and registered and re-labeled the product so that these dried grains are now being sold in the State as either "Distillers and Yeast Dried Grains" or "Yeast Dried Grains," as the case may be.

Another by-product new to the feeding stuffs industry has been introduced as an ingredient in mixed feeds which is now being used under its proper name of "Ivory Nut Meal." This product was introduced also early in the year under another name; but after the analysis of a few samples and an identification of the product by the Bureau, the true character of the product was learned. This matter was also placed before the Association of Feed Control Officials for the adoption of a definition, with the result that the name "Ivory Nut Meal" is now being used. This product is the ground cuttings from the manufacture of buttons from the ivory nut. The analysis shows it to contain very little protein and fat, but a rather high percentage of carbohydrates which appear to be somewhat digestible. As the law does not prohibit the use of this product, no objection could be made to the use of the same as an ingredient in mixed feeds providing it was properly designated. There is only one company using this meal at the present time, and as the supply is limited, it is quite likely there will not be much of it sold in Pennsylvania.

Another product, also new to the feeding stuffs industry, made its appearance, and after an examination and analysis of a number of samples, registration for feeds containing it were refused. The products was put out under the name of "Vegetable Meal," which is especially prepared, sterilized and dried garbage tankage. The Bureau deemed it improper for this by-product to be used as an ingredient in mixed feeds for the reason that it contained small particles of glass which were, no doubt, introduced into the garbage by broken glassware. The propriety of permitting this material to be used as a feeding stuffs is now being considered by the various State officials. The company manufacturing this product have stated to the Association that the method of manufacturing has not been fully perfected, as an attempt is being made to entirely eliminate any particles of glass or other foreign materials and remove all objectionable features. If this so called "Vegetable Meal" can be sold under a name properly describing it and all foreign particles can be removed, it will, no doubt, be of considerable value as an ingredient in feeding stuffs.

The general character of the feeding stuffs sold in the State during 1915, as judged from the samples examined, was good. Considerable improvement has been made with respect to labeling, meeting the guarantees and keeping out the weed seeds from chicken feeds. There is still room, however, for improvement in this respect and as the work progresses from year to year the objectionable features referred to will, no doubt, be largely overcome. The usual number of registrations were received and filed representing over 1,600 kinds and brands of feeds. In December requests for 1916 registrations were sent out with a ruling to the effect that the Department deemed it contrary to the provisions of the feeding stuffs law to use the so-called "sliding guarantees" for protein, fat and fiber. For a number of years this method of guaranteeing has been in vogue and the results of inspection work made by this Bureau show that in the majority of cases the maximum guarantees are not met and in many cases the lower guarantees were frequently too high. Such guarantees, therefore, are misleading and it is hoped that this ruling will be complied with during the coming year. When making requests for the 1915 registrations an attempt was made to determine the approximate number of tons of feeding stuffs sold in the State during 1914. Accordingly requests for this information were sent out with registration blanks to which a majority of the firms replied giving the approximate number of tons shipped or sold by these firms. After these figures had been received they were tabulated and returned to the firms sending them in. It is believed that the total number of tons sold in Pennsylvania, according to these figures, was entirely too low, however, as a number of the large firms refused to give us the information, the correct figures could not be ascertained. According to the reports received over 600,000 tons of all classes of feeding stuffs were sold in the State during 1914. These figures are interesting as they show the enormous quantities of feeds being disposed of in the Commonwealth; and it also indicates the need of the enforcement of a feeding stuffs law to make sure that all these feeds are properly labeled and sold in accordance with the requirements. The figures received are as follows:

Cottonseed meal, 22,423 tons; linseed oil meal, 9,277 tons; distillers' dried grains, 7,627 tons; brewers' dried grains, 8,925 tons; malt sprouts, 1,547 tons; corn gluten feed, 48,427 tons; corn gluten meal, 228 tons; hominy feed, 16,517 tons; corn bran, 1,644 tons; corn feed meal, 1,800 tons; wheat offals, 217,551 tons; wheat offals with admixtures, 4,457 tons; rye offals, 1,350 tons; buckwheat offals, 464 tons; alfalfa meal, 2,441 tons; dairy feeds, 61,098 tons; stock, horse, mule and chop feeds, 83,592 tons; calf meals, 1,116 tons; miscellaneous feeds, 56 tons; oat feed, 2,403 tons; beet pulp, 8,200 tons; swine feed, 2,037 tons; poultry foods, 31,346 tons; animal by-products, 5,382 tons; fish scrap, 8 tons; condimental foods, 314 tons; feeds not classified, 86,467 tons. Total reported, 626,397 tons.

The number of official samples of linseed oil collected by Special Agents during the year was 185. These samples were purchased from various dealers in the State, representing the raw and boiled linseed oil being offered for sale, and were placed in clean bottles and sent to the Bureau for analysis, together with a report covering each sample. While this number was not as great as it should be to make the linseed oil inspection work thorough, the lack of sufficient funds made it impossible for a greater number of samples to be analyzed. The results of analysis showed that three were grossly adulterated with mineral oil in amounts ranging from 6% to 56%. A few of the samples were found to have been accidentally contaminated by careless handling. Prosecutions were ordered in the three cases referred to which resulted in fines of $50 each being paid amounting to $150 which was paid to the State Treasurer as required. A report was made to the Secretary of Agriculture showing the information submitted by the Special Agent and the results of analysis on each sample. A report was also sent out covering each sample to the dealers from whom the samples were secured and to the manufacturers advising as to whether or not the oils passed the standard of purity established by the linseed oil law. During the year only two special samples of linseed oil were submitted for analysis with the fee of $1.00 in each case which is required. These samples were analyzed and reports made to the senders with receipt of fees and the fees were paid to the State Treasurer.

In carrying out the provisions of the law regulating the sale of seeds, Special Agents of the Department secured from seed dealers in the State 221 official samples. These samples were each tested for purity and in addition to a report being submitted to the Secretary of Agriculture, reports were sent to the dealers from whom the samples were secured and to the seedsman or seed growers from whom the original purchase was made. The seeds examined represented 19 kinds, and an average of the purity test of each kind of seed was found to exceed the standards of purity established by the seed law. Out of the total number of seeds examined, only 11 fell slightly below the standard of purity. The seeds of dodder and Canada thistle were found present in 15 samples of seeds, but not in sufficient numbers to be in excess of one seed in 3,000, the number restricted in the seed law. The seeds of Dodder were found more numerous in red clover and alfalfa and the seeds of Canada thistle were the more numerous in alsike clover. The number of special samples of seeds sent to the laboratory to be tested during the year, as provided for, was 235. The fee charged for this work is 25 cents per sample and, therefore, $58.75 was received and paid to the State Treasurer from time to time as required. As soon as possible after the receipt of each sample reports were returned to the senders showing the results of test for purity and including a receipt of the fees received. In a number of these special samples it was found that the purity test was less than that required and where the seeds were recleaned and additional samples tested, the foreign seeds were largely removed making it possible for the lot of seed samples to be legally offered for sale. This work has proved of great assistance to those seed growers and seedsmen who are desirous of selling pure seed and the opportunity of having samples tested for a small fee by the Department is being taken advantage of as will be noted by the number of special samples submitted. The Bureau co-operated in the work of the Association of Seed Analysts of North America by making purity tests in a few standard samples of seeds which were sent in to be examined by the Seed Analyst. In December the Seed Analyst of the Bureau attended the annual meeting of the Association of Seed Analysts representing the Department in this work. The results of the co-operative work and the information secured at the meeting proved that the work of testing seeds for purity was being carefully and accurately performed by this Department.

As soon as possible after the close of the year, Bulletins were prepared showing the results of the feeding stuffs, linseed oil and seeds inspection work. The feeding stuffs report made up 221 pages, the linseed oil, 20 pages, and the seed report, 36 pages. These Bulletins were mailed to approximately 6,000 manufacturers of and dealers in feeding stuffs and linseed oil, and to several hundred seedsmen by the Bureau of Distribution of Documents. The establishment of a Bureau to take care of the mailing of large numbers of reports has relieved this Bureau of this clerical work.

In November, the Department was represented at the annual meeting of the Association of Feed Control Officials of the United States by the Chief Chemist and General Agent. These meetings prove of great value to the officials of all the states, as many problems arising in the various localities are discussed, definitions agreed upon for the various feeding stuffs by-products and other matters pertaining to the work are brought before the meeting. A committee was appointed by the Association, of which the Chief Chemist is a member, to make a further study of the character of the product knowns as "Refuse Middlings," which is being sold as a feeding stuff and which is a by-product or residue from the manufacture of tin plate. In some localities it was found that these middlings contain small particles or slivers of tin which will cause harm when fed to stock. The larger manufacturing concerns have arranged to introduce electro magnets in their plants which would remove these large pieces, however, it was thought advisable to note what effect, if any, the small amount or traces of tin would have upon stock fed this material. Accordingly arrangements were made with the Livestock Sanitary Board whereby this feed, during the coming year, will be tested and the results of the feeding tests together with the analysis of the product will be reported at the 1916 meeting of the Association. One of the large manufacturers putting out this product, located in Pittsburgh, have shipped two tons, free of charge, to the Veterinary Department at Philadelphia with which to carry on the feeding experiment.

The 1915 session of the General Assembly passed laws regulating the sale of paint, putty and turpentine and lime, the enforcement of which having been delegated to the Secretary of Agriculture necessitated making arrangements for the proper laboratory equipment to analyze samples and carry out the provisions of these acts. As additional laboratory space could not be furnished in the Capitol where the Department chemical laboratories had been established for a number of years, the Board of Public Grounds and Buildings remodeled a building in the Capitol Park Extension area for laboratories and offices for the Bureau of Chemistry. Considerable time, therefore, was given to making plans and provisions for equipping the laboratories, to properly carry on the various lines of work. Early in November arrangements were made to move the equipment and install the same in the new quarters and by December the apparatus and office equipment had been installed and placed in working condition. There were a number of weeks during this period when it was impossible to do any chemical work and accordingly the collection of samples by the Special Agents was discontinued for a short time, the Special Agents and Assistant Chemists assisting in moving and installing the apparatus and getting ready for continuing the work in the present quarters. In addition to the offices, we now have a laboratory especially equipped for the analysis of paints, oils, turpentines and putties and laboratories for the analysis of feeding stuffs, lime, seeds and additional space for any other work which may be given to the Bureau to do. It was necessary to install additional equipment for the analysis of paints and lime and preparations have been made for carrying out the provisions of these new laws and to do as much work as is possible with the funds which have been provided. The enforcement of the law regulating the sale of paints made it necessary for a number of conferences to be held with paint manufacturers with respect to labeling. As a result of a conference held during November a ruling was agreed upon by the Department officials and representatives of the Paint Manufacturers Association, to the effect that all painting materials which had been reduced by the addition of "extenders" should be labeled "Compound." Circular letters were issued to the trade giving this ruling and requesting labels to be submitted for examination. Many of these labels have already been received and placed on file and from what work has thus far been accomplished, it appears that the manufacturers are co-operating with the Department in carrying out the provisions of the paint law.

The work of moving and preparing for additional duties has not seriously interfered with the ordinary routine of the Bureau, and as the average number of samples of feeding stuffs, linseed oil and seeds have been analyzed and the inspection work carried on in as thorough a manner as was possible with the funds available for this work. The amount of money, $3,000, appropriated for the enforcement of the paint law is entirely too small to properly carry on this work and should be materially increased, if the inspection of paints throughout the State is to be properly carried on. The amount of money appropriated for the feeding stuffs work for the fiscal two year period was $20,000 instead of $30,000, the amount of the previous period. This reduction in the appropriation for enforcing the provisions of the feeding stuffs law is not sufficient enough to properly carry on this line of work and should be materially increased. There was only $2,000 appropriated for this Bureau for the enforcement of the linseed oil law and if the Department is to prohibit the sale of adulterated and impure linseed oil in the State, a larger appropriation will be necessary. The appropriation for the seed inspection work was $2,500 which does not enable the Department to make a thorough inspection and collection of seeds as would be desirable. It is recommended, therefore, that the budget presented at the next session of the Legislature include appropriations for the enforcement of the various laws given to the Department to enforce, in amounts sufficient enough to enable the Department to protect the consumers of the State from being sold inferior articles, as is the intent of these various acts.

The field work of collecting samples for analysis has been so arranged that the expenses have been reduced to a minimum. The agents are assigned to certain territory and secure samples for analysis under each of the laws and in this way save duplication of traveling expenses.

The general office and clerical work of the Bureau has increased slightly over that of the previous year owing to the extra correspondence necessary to the enforcement of the paint and lime laws. Up to the present time, however, it has not been necessary to employ additional help and it is hoped by a systematic arrangement of the work, all correspondence can be promptly attended to and inquiries pertaining to the various lines of work promptly answered. Each member of the Bureau staff have shown a splendid interest in performing their many duties and a great deal of credit should be extended to them for the enthusiastic manner in which they have helped to make the work of the year a success.

REPORT OF THE BUREAU OF STATISTICS.

Harrisburg, Pa., January 1, 1916.

Hon. Charles E. Patton, Secretary of Agriculture:

Dear Sir: I have the honor to submit herewith a report of the Bureau of Statistics of the Department of Agriculture, for the year ending December 31, 1915. It covers the work for the year and contains somestatistical data that may be useful for public information.

CROP AND LIVESTOCK REPORTS

The collection of monthly reports relative to cereal crops, potatoes, hay, fruit, livestock, miscellaneous matter along agricultural lines, etc., was begun something over one year ago. The success that has been attained in this undertaking is very largely due to the efficient corps of township reporters that the Bureau was fortunate in securing. At present we have about seven hundred and fifty correspondents and receive nearly seven hundred reports each month. I submit herewith and make a part of this report the following statistical information taken from the various reports received during the year:

CEREALS

Wheat—Estimated area harvested, 1,312,000 acres; average production per acre, 19 bushels; total estimated production, 24,928,000 bushels; average price per bushel, $1.05; total value of crop, $26,174,000.00; average date when seeding began, September 27.

Corn—Estimated area harvested, 1,522,000 acres; average production per acre, 36 bushels; total estimated production, 54,792,000 bushels; average price per bushel, 76 cents; total value of crop, $41,641,920.00; cut for ensilage, 16 per cent.; average date when planting began, May 6.

Rye—Estimated area harvested, 271,600 acres; average production per acre, 17.2 bushels; total estimated production, 4,672,000 bushels; average price per bushel, 85 cents; total value of crop, $3,971,200.00.

Oats—Estimated area harvested, 1,094,000 acres; average production per acre, 39 bushels; total estimated production, 43,095,000 bushels; average price per bushel, 46 cents; total value of crop, $19,823,700.00.

Buckwheat—Estimated area harvested, 277,200 acres; average production per acre, 20 bushels; total estimated production, 5,540,000 bushels; average price per bushel, 78 cents; total value of crop, $4,321,000.00.

POTATOES

Potatoes—Estimated area harvested, 273,360 acres; average production per acre, 75 bushels; total estimated production, 20,502,000 bushels; average price per bushel, 80 cents; total value of crop, $16,401,600.00.

TOBACCO

Tobacco—Estimated area harvested, 31,500 acres; average production per acre, 1,450 pounds; total estimated production, 45,675,000 pounds; average price per pound, 10 cents; total value of crop, $4,567,500.00.

Hay—Estimated area harvested, 3,015,000 acres; average production per acre, 1.18 tons; total estimated production, 3,558,000 tons; average price per ton, $15.90; total value of crop, $56,572,200.00.

HAY

Alfalfa—acreage harvested compared with last year, 104 per cent. Average number of cuttings, 3; average production per acre from all cuttings, 2.8 tons.

FRUIT

Apples—Average price per bushel, 68 cents.

Peaches—Average price per bushel, 45 cents.

Pears—Average price per bushel, 85 cents.

Plums—Average price per quart, 5 cents.

Cherries—Average price per quart, 9 cents.

Strawberries—Average price per quart, 10 cents.

Raspberries—Average price per quart, 10 cents.

Blackberries—Average price per quart, 8 cents.

LIVESTOCK AND POULTRY

Horses—Estimated number on farms, 596,000; average value per head, $121.00; approximate total value of horses in the State, $72,116,000.00; estimated number of pure bred stallions, 1,500.

Mules—Estimated number, 46,000; average value per head, $128.00; approximate total value of mules, $5,888,000.00.

Milch Cows—Estimated number, 952,000; average value per head, $55.50; approximate total value of cows, $52,836,000.00.

Other Cattle—Estimated number, 644,000; average value per head, $29.00; approximate total value of other cattle, $18,676,000.00; estimated number of pure bred bulls, 8,250; fat steers, average price per pound, 7 cents; for feeding, average price per pound, 6 cents; farmers fattening steers for spring (1915) market, 10 per cent.

Sheep—Estimated number, 806,000; average price per head, $5.40; approximate total value of sheep, $4,352,400.00; estimated number of pure bred rams, 3,200.

Hogs—Estimated number, 1,186,000; average value per head, $11.80; approximate total value of hogs, $13,974,800.00; estimated number of pure bred boars, 6,500; shoats, average price per pound, 8 cents; fat, average price per pound, 8 cents.

Chickens—Dressed, price per pound, 18 cents; live, price per pound, 12 cents.

Ducks—Dressed, price per pound, 19 cents; live, price per pound, 13 cents.

Geese—Dressed, price per pound, 19 cents; live, price per pound, 14 cents.

Turkeys—Number compared with an average, 77 per cent.; dressed, price per pound, 27 cents; live, price per pound, 21 cents.

PRODUCE

Butter—Average price per pound, 33 cents.

Milk—Wholesale, average price per 100 pounds, $1.76; retail, average price per quart, 7 cents.

Eggs—Average price per dozen, 35 cents.

Honey—Average price per pound, 17 cents.

FARM LAND AND WAGES

Farm land, improved, value per acre, $76,000.

Farm land, average, value per acre, $50.00.

Farm wages, by year, with board, $235.00.

Farm wages, for summer months only, $25.00.

Farm wages, by day, with board, $1.20.

Farm wages, by day, without board, $1.60.

Farm wages, harvest, by day, $1.80.

Household help, female, with board, per week, $3.20.

MISCELLANEOUS

Automobiles—Approximate number of farmers using at the bebeginning of the year, 15,000.

Lime—Number of farmers using for agricultural purposes, 48 per cent.

Commercial Fertilizers—Farmers using, 88 per cent.; average amount used by each farmer, 2 tons; average amount used per acre, 235 pounds; total number of tons used, 381,920; average price paid per ton, $20.80; total amount paid, $7,943,900.00.

Stable Manure—Approximate value of produced on the farms, $14,322,000.00.

Spraying—Farmers spraying for insects pests and plant diseases, 27 per cent.

Silos—Farmers using silos, 9 per cent.

The following comparison of tables for the past nine years shows the prices of the various products of Pennsylvania:

TABLE OF COMPARISON

	1907	1908	1909	1910	1911	1912	1913	1914	1915
Wheat,	$0 95	$0 96	$1 10	$0 95	$0 90	$0 95	$0 94	$1 03	$1 05
Corn,	65	71	75	65	70	70	75	78	76
Oats,	53	55	50	43	50	45	47	50	46
Rye,	73	76	77	75	80	80	75	83	85
Buckwheat,	68	73	70	62	70	65	72	76	78
Hay, clover,	11 00	10 50	12 00	12 00	18 00	14 00	13 00	13 00	15 90
Hay, timothy,	16 50	13 00	15 60	15 00	21 00	16 00	15 00	15 20	
Horses, average,	148 00	150 00	150 00	150 00	160 00	160 00	160 00	150 00	121 00
Mules, average,	155 00	160 00	160 00	175 00	175 00	175 00	170 00	156 00	128 00
Cows, average,	37 00	36 00	38 00	42 00	40 00	45 00	55 00	58 00	55 50
Lambs, average,	4 25	4 00	4 00	4 00	3 00	4 00	4 25	4 40	5 00
Ewes, average,	4 75	4 50	4 25	4 00	4 00	4 50	4 50	4 75	5 40
Steers, fat, per pound,	06	05	06	06	05	06	08	08	07
Steers, for feeding, per pound,	04	04	05	05	04	05	06	06	06
Swine, shoats, per pound,	06	06	07	08	07	07	09	09	08
Hogs, fat, per pound,	08	07	08	09	08	08	10	10	08
Chickens, dressed, per pound,	15	14	16	17	17	18	18	18	18
Chickens, live, per pound,	10	10	12	12	11	12	14	13	12
Apples, per bushel,	70	70	85	75	70	65	86	52	68
Peaches, per basket,	1 50	1 20	1 25	1 50	1 25	1 00	1 10	86	45
Pears, per bushel,	1 10	85	1 10	95	85	90	1 10	80	85
Plums, per quart,	08	07	07	07	08	08	08	06	05
Cherries, per quart,	09	07	08	08	08	08	09	08	09
Blackberries, per quart,	08	07	09	08	08	08	09	08	08
Raspberries, per quart,	09	09	07	08	09	09	10	10	10
Potatoes, per bushel,	70	80	70	55	95	60	80	62	80
Butter, per pound, at store,	27	27	28	28	28	28	30	31	33
Butter, per pound, at market,	30	30	32	31	30	32	33	33	
Milk, wholesale, per 100 pounds,	1 50	1 30	1 40	1 60	1 50	1 50	1 60	1 63	1 76
Milk, retail, per quart,	06	06	07	07	07	07	07	07	07
Eggs, per dozen,	27	27	28	28	28	28	30	31	35

SHEEP KILLED AND INJURED BY DOGS

It has been a well known fact all these years that the dogs have been detrimental to the sheep industry of this State. In order that the public may know the extent of this damage this Bureau, through the County Commissioners' offices, secured the data for the year 1914. This information has been tabulated in detail and is submitted herewith and made a part of this report. I desire to add that estimates received from our correspondents places the number of sheep in the State at seventy per cent. compared with the number ten years ago. There seems to be a decline of about three per cent. per year. It is very evident that we need additional legislation to protect this important but fast declining industry from the ravages of the dogs.

Sheep killed and injured by dogs, amount of damages paid, dog tax collected, how expended, etc., in Pennsylvania, by counties, for the year 1914. Collected and compiled by L. H. Wible, Statistician, Department of Agriculture.

Counties	Sheep killed	Sheep injured	Average price paid for sheep killed	Average price paid for sheep injured.	Amount paid for sheep killed and injured, including costs	Amount of tax levied for each male dog.	Amount of tax levied for each female dog	Amount of dog tax collected	Number of dogs killed by direction of the county commissioners and tax collectors	Amount expended for the killing of dogs by constables and borough policemen	Amount expended for the payment of horses, etc., bitten by mad dogs.	Amount expended for dog tags
Adams,	1	10	$10 00	$3 10	$51 00	$0 50	$1 00	$1,945 50	....	....	....	$37 60
Allegheny,	49	26	5 55	3 27	436 50	1 00	2 00	11,846 45	313	$313 00	$891 00	113 75
Armstrong,	76	83	7 20	2 64	938 50	1 00	2 00	3,643 66	65	65 00	....	45 00
Beaver,	130	80	4 82	2 50	967 60	1 00	2 00	1,066 70	9	9 00	9 50	35 00
Bedford,	256	218	5 50	2 50	1,926 92	75	1 50	3,116 42	34	....	....	55 50
Berks,	....	....	....	....	....	50	50	1,678 45	40	....	70 66	96 00
Blair,	90	40	5 05	2 00	665 30	50	1 00	1,380 82	12	12 00	....	36 00
Bradford,	275	20	7 00	3 02	2,255 25	1 00	2 00	2,728 20	11	1 00	....	43 00
Bucks,	1	21	8 00	5 04	120 75	50	1 00	3,098 50	....	33 00	44 50	80 50
Butler,	122	137	5 95	3 38	1,269 25	1 00	2 00	3,625 32	....	....	346 00	42 75
Cambria,	43	24	10 00	5 00	636 25	1 00	2 00	3,100 00	17	17 50	....	37 50
Cameron,	3	....	10 66	....	36 00	35	1 50	268 00	....	....	....	6 68
Carbon,	....	....	....	....	....	50	50	679 00	....	....	....	37 50
Centre,	33	30	6 17	6 28	341 95	50	1 00	1,935 00	....	....	43 00	38 00
Chester,	1	....	10 00	....	11 00	50	50	546 00	....	....	....	23 50
Clarion,	46	42	6 23	3 08	506 00	50	1 00	1,424 03	11	11 00	....	43 75
Clearfield,	38	....	5 58	....	427 33	1 00	2 00	3,191 35	....	....	....	52 81
Clinton,	4	1	9 25	....	47 25	50	1 00	1,097 75	....	....	....	25 36
Columbia,	....	....	....	....	....	25	....	300 76	....	....	....	35 00
Crawford,	303	....	7 20	....	2,182 75	1 00	2 00	5,177 00	....	....	....	....
Cumberland,	86	6	6 00	3 00	557 80	25	25	752 75	24	25 00	116 00	54 00
Dauphin,	....	....	....	....	....	25	50	834 50	23	23 25	118 00	56 28
Delaware,	1	....	18 00	....	25 00	....	....	4,692 10	25	25 00	....	56 80
Elk,	5	....	5 00	....	31 00	50	50	938 54	13	13 00	....	37 65
Erie,	299	166	6 80	3 42	2,790 50	1 00	2 00	5,581 90	....	14 00	....	71 40
Fayette,	87	58	4 79	2 13	663 75	50	1 00	3 268 47	50	90 00	334 00	80 50
Forest,	1	....	5 00	....	11 50	1 00	2 00	749 00	....	....	....	11 50
Franklin,	120	84	5 64	2,87	1,152 65	35	35	1,294 88	6	6 00	83 00	37 50
Fulton,	42	14	4 91	1 57	298 28	25	50	329 81	....	....	....	14 75
Greene,	509	556	3 78	1 66	3,885 89	2 00	3 00	4 711 00	23	23 00	111 00	30 28
Huntingdon,	97	43	6 21	3 01	846 00	75	1 00	890 00	....	....	....	26 25
Indiana,	97	63	6 53	4 00	1,031 40	1 50	3 00	2 226 00	52	104 50	136 00	54 00
Jefferson,	33	30	6 60	5 80	551 00	1 00	2 00	3,770 00	147	147 00	108 00	44 00
Juniata,	13	7	6 00	1 58	118 75	25	50	223 70	....	....	....	20 50
Lackawanna,	58	26	7 10	4 52	482 00	....	....	2,105 00	....	....	93 00	37 50

Lancaster,	18	7	....	....	125 50	50	1 00	[illegible]	16	16 00	....	63 00
Lawrence,	70	146	4 91	2 45	865 92	1 00	3 00	2,556 00	26	32 50	54 00	40 00
Lebanon,	....	....	....	....	....	....	....	....	....	....	....	....
Lehigh,	....	....	....	....	....	....	....	....	....	....	....	....
Luzerne,	17	2	7 18	3 00	148 00	40	40	3,157 60	30	30 00	81 00	125 00
Lycoming,	60	54	5,72	3 05	619 50	50	1 00	2,126 00	7	7 00	....	36 00
McKean,	57	40	7 15	3 80	770 00	1 00	3 00	2,565 00	6	6 00	....	36 00
Mercer,	200	427	5 65	2 77	2,843 50	2 00	4 00	6,988 24	27	27 00	29 00	36 00
Mifflin,	35	29	5 87	4 03	374 60	50	1 00	751 50	....	....	....	15 00
Monroe,	16	9	7 50	2 44	160 00	50	1 00	[illegible]	9	9 00	....	26 25
Montgomery,	10	5	16 25	7 50	207 25	50	2 00	[illegible]	....	....	33 75	66 00
Montour,	....	....	....	....	....	50	50	520 00	5	5 00	....	17 40
Northampton,	4	2	17 50	....	76 00	25	1 00	895 61	....	....	....	52 50
Northumberland,	2	....	7 50	....	18 50	50	1 00	1,472 81	....	....	45 50	49 50
Perry,	3	5	5 00	3 30	46 50	20	50	451 80	....	....	....	29 20
Philadelphia,	....	....	....	....	....	....	....	....	....	....	....	....
Pike,	8	3	6 50	3 00	83 75	25	1 00	311 00	....	....	....	18 00
Potter,	129	43	6 08	[illegible]	1,060 75	50	1 00	[illegible]	8	8 00	....	23 50
Schuylkill,	....	....	....	....	....	50	50	[illegible]	....	....	[illegible]	64 00
Snyder,	1	....	15 00	....	19 00	15	50	[illegible]	....	....	....	22 00
Somerset,	225	95	6 52	2 80	2,120 86	1 00	4 00	4,713 00	72	72 00	....	49 50
Sullivan,	[illegible]	41	5 72	3 13	659 50	50	1 00	358 00	....	....	....	16 50
Susquehanna,	....	....	....	....	....	....	....	....	....	....	....	....
Tioga,	306	151	6 23	3 58	2,940 46	1 00	1 50	....	1	1 00	....	44 85
Union,	....	....	....	....	....	25	50	198 85	2	2 00	52 00	21 75
Venango,	74	67	5 44	2 89	[illegible]	1 00	2 00	2,230 35	....	....	....	20 00
Warren,	62	27	6 39	3,07	555 20	50	50	1,246 27	....	....	....	....
Washington,	503	581	3 96	1,57	[illegible]	1 50	3 00	5,856 50	310	310 00	485 00	54 75
Wayne,	100	63	6 83	3,52	1,103 25	1 00	2 00	2,340 00	21	21 00	....	37 50
Westmoreland,	190	121	5 86	3 09	1,824 60	1 00	2 00	8,744 13	573	573 75	27 50	85 00
Wyoming,	26	110	6 01	1 14	335 14	1 00	3 00	1 208 81	7	7 00	....	24 85
York,	20	....	8 02	....	205 00	50	1 00	1,937 47	....	....	58 00	80 00
Total,	5,187	3,813	....	....	$46,640 70	....	....	$147,815 88	2,035	$2,039 50	$3,428 89	$2,671 66
Average,	....	....	$7 19	$3 15	....	$0 70	$1 43	....	....	....	....	....

*Under a special act, each township and borough in Susquehanna County collects its own dog tax and pays its own damages. The data from that county is not included in the above statement.

It will be observed also that the above statement only relates to the dog tax collected in the townships and boroughs of the State.

CREAMERIES, CHEESE FACTORIES, MILK CONDENSERIES AND CANNERIES

To meet a demand for information relative to creameries, cheese factories, milk condenseries and canneries, this Bureau made diligent inquiry in every county in the State. We have collected what is generally considered fairly correct lists, which show 666 creameries, 86 cheese factories, 26 milk condenseries and 55 canneries. This data was published in bulletin form under the supervision of the Dairy and Food Commissioner.

PENNSYLVANIA FARMS FOR SALE

To supply a demand for information relative to farms for sale in this State and as suggested in our report one year ago, this Bureau has placed in the newspapers throughout the State, a news item making known the fact that we contemplate compiling and publishing a bulletin of this character. We have received the descriptions of over three hundred farms located in fifty-six counties. These farms range in price from two dollars and fifty cents per acre to over one hundred dollars per acre. This bulletin was nearly completed at the close of the year and will be given to the public early in 1916. We believe the publishing of this bulletin will be time and money well spent and will improve the efficiency of the farmers of the State, and result in the occupation of many farms by persons who will turn their energy toward helping to meet the demand of our people for food supplies in a more substantial way than is being done by the present occupants.

CONCLUSION

In the execution of the work of this Bureau during the year about twenty-six hundred letters were written. Many of these letters were answers to inquiries for information of a statistical character along agricultural lines.

This Bureau is yet young and our office force is small, but we feel that we are on a substantial basis; and with honest effort, we hope to see it become a valuable adjunct to the Department of Agriculture and of value and interest to the people of the entire Commonwealth.

Respectfully submitted,

L. H. WIBLE,
Statistician.

REPORT OF FERTILIZER CONTROL.

During the year thirteen agents were employed to take samples in the following districts, namely:

W. L. Dougless, Enon Valley: Beaver, Lawrence, Mercer, Crawford, Erie and Venango counties.

Walter A. Weaver, Johnstown, R. D. No. 4: Somerset, Westmoreland, Fayette and Greene counties.

H. M. Gooderham, Patton: Blair, Cambria, Indiana, Armstrong and Clearfield counties.

Wm. D. Griffith, Windham: Potter, Tioga, Bradford, Susquehanna, Wyoming and Lackawanna counties.

Joel A. Herr, Mill Hall (Spring), and Norman B. Stiteler, Danville (Fall): Clinton, Lycoming, Northumberland, Montour and Columbia counties.

James I. Thompson, Lemont: Centre, Union, Snyder, Juniata and Mifflin counties.

Geo. W. Oster, Osterburg: Huntingdon, Fulton and Bedford counties.

Ed. B. Geedling, Loganville: York, Adams, Franklin counties.

Clark G. Long, Jonestown: Lebanon, Cumberland, Perry and part of Dauphin counties.

W. John Stitler, Danville: Berks, Lancaster and part of Dauphin counties.

Joseph P. Jackson, Kelton: Chester, Montgomery, Bucks, Philadelphia and Delaware counties.

Jas. H. Dunkelberger, Hegins: Luzerne, Schuylkill and Lehigh counties.

Alfred Meyers, Easton: Carbon, Northampton, Monroe, Wayne and Pike counties.

These districts were canvassed twice during the year and resulted in the collection of 2,454 samples of commercial fertilizers. The expenses for these services were $4,767.56.

In addition, W. John Stiteler was employed during a part of the year on special investigation work and making informations against offenders. He also checked the work of the other agents where questions occurred concerning their work. The remainder of his work was devoted to the work of the Bureau of Chemistry.

The analytical work was executed by the Pennsylvania Experiment Station, as heretofore, at a charge of $3.00 for each determination, including correspondence, 'manuscript and proof reading. All check work, where samples fell below guarantee, was performed without charge.

Summaries of these analyses are herewith annexed for permanent record.

SPRING SEASON

	Complete	Rock and potash	Dissolved bone	Dissolved rock	Ground bone
Number of analyses,	422	86	9	48	32
Moisture, per cent.,	7.89	8.06	5.91	7.99	3.52
Prosphoric acid:					
Total, per cent.,	10.56	12.35	12.35	16.87	21.46
Available, per cent.,	9.05	11.29	9.74	15.84	....
Insoluble, per cent.,	1.51	1.06	2.61	1.03	....
Potash, per cent.,	3.05	2.16	....	....	....
Nitrogen, per cent.,	1.95	....	2.01	....	2.96
Mechanical analyses of bone:					
Fine,	....	....	....	....	53
Coarse,	....	....	....	....	47
Commercial valuation,*	28.45	16.47	24.30	13.97	30.26
Average selling price,*	25.50	16.90	24.09	14.00	33.40

FALL SEASON

Number of analyses,	238	48	32	39	21
Moisture, per cent.,	....	....	....	....	....
Phosphoric acid:					
Total, per cent.,	10.41	12.07	12.35	16.02	23.03
Available, per cent.,	9.11	11.08	10.32	15.13	....
Insoluble, per cent.,	1.30	.90	3.03	.89	....
Potash, per cent.,	1.94	1.87	....	....	....
Nitrogen, per cent.,	1.28	....	1.36	....	3.13
Mechanical anaylses of bone:					
Fine,	....	....	....	....	52
Coarse,	....	....	....	....	48
Commercial valuation,*	23.13	15.75	18.32	13.41	33.56
Average selling price,*	21.79	16.89	21.52	13.83	32.79

*Dollars per ton.

Detailed reports of this work appear in Bulletins Nos. 269 and 277.

This work also divulged that many persons place upon the markets of this State mixed brands and chemicals for fertilizing purposes without first complying with the "Fertilizer Laws." In each such case where these fertilizers were found, the principal was given an opportunity to register the same by notifying them of these apparent oversights. The notices resulting in prompt compliance with the law.

During the year but one deficiency case warranted prosecution and three cases were prosecuted for selling fertilizers which were not registered, resulting in payment of $103.72 into the State Treasury as fines and costs.

The registration of fertilizers showed 1,488 brands and chemicals with fees amounting to $25,365.00.

The tonnage of fertilizers, reported to April 1, 1916, showed that during the year 316,319 tons were sold in this State. There are some omissions in this amount as the unsettled condition of the materials market has confused many manufacturers and some have not made up their 1916 brands at this date. Wherever possible to secure service, prosecution will be recommended against these delinquents.

Also wish to direct your special attention to the reduction in the number of brands and materials registered during the year and the amount of registration fees received by the Department and compare the same with the registration for the year 1914.

The tendency of the trade in general has been to reduce the number of brands, which has resulted in a loss of revenue, while the total tonnage of fertilizers consumed in this State has remained normal.

An effort was made by the State Board of Agriculture at the last session of the Legislature to amend the fertilizer law by changing the manner of collecting this revenue from a fee tax to a tonnage tax. The bill met with strong opposition and was defeated. The wisdom of this change is now shown in a practical way and must come sooner or later if this work is to be self-sustaining, if not suspended, unless given State aid from other sources.

The work also should be organized in such manner as to enable the agents to be in the field for a longer period than four weeks each season, or a larger number of agents should be employed for the short period. This latter arrangement would be preferable on account of the rapid movement of fertilizers, especially during the spring season.

I would also recommend that one sample of fertilizer be analyzed for each 50 tons of a single brand sold in this State, the practice of composing three samples to be continued and all samples to be run in multiples of three, the agents being careful not to duplicate samples of the same shipment.

In conclusion, permit me to call to your attention the loyalty of the field force and the manner in which they co-operated with the Department in prosecuting this work. They have been faithful to their trust and not a single complaint has reached the Department with respect to their work.

Respectfully submitted,

HENRY E. KLUGH,

Clerk.

LIST OF COUNTY INSTITUTE MANAGERS FOR THE SEASON OF 1915-1916.

County.	Name and Address of Chairmen.
Adams,	A. I. Weidner, Arendtsville.
Allegheny,	C. L. Hood, Coraopolis, R. D. No. 3.
Armstrong,	S. S. Blyholder, Kelly Station.
Beaver,	Walter C. Dunlap, West Bridgewater.
Bedford,	W. F. Biddle, Everett, R. D. No. 2.
Berks,	H. G. McGowan, Geiger's Mills.
Blair,	W. Frank Beck, Altoona.
Bradford,	F. D. Kerrick, Towanda, R. D. No. 9.
Bucks,	B. F. Wambold, Sellersville.
Butler,	W. H. Milliron, Euclid.
Cambria,	L. H. Bearer, Hastings, R. D.
Cameron,	R. P. Heilman, Emporium.
Carbon,	Edward Lienhard, Mauch Chunk, R. D. No. 1.
Center,	John A. Woodward, Howard.
Chester,	M. E. Conard, Westgrove.
Clarion,	J. H. Wilson, Clarion.
Clearfield,	Harrison Straw, Clearfield.
Clinton,	Joel A. Herr, Millhall.
Columbia,	A. P. Young, Millville.
Crawford,	W. F. Throop, Espyville.
Cumberland,	T. J. Ferguson, Mechanicsburg.
Dauphin,	E. S. Keiper, Middletown.
Delaware,	Thos. H. Wittkorn, Media.
Elk,	John G. Schmidt, St. Marys.
Erie,	Archie Billings, Edinboro.
Fayette,	John T. Smith, Dunbar, R. D. No. 32.
Forest,	C. A. Randall, Tionesta.
Franklin,	J. P. Young, Marion.
Fulton,	Frank Ranck, Hancock, Md.
Greene,	J. W. Stewart, Jefferson.
Huntingdon,	G. G. Hutchison, Warrior's Mark.
Indiana,	S. C. George, West Lebanon.
Jefferson,	Peter B. Cowan, Brookville.
Juniata,	Matthew Rodgers, Mexico.
Lackawanna,	Horace Seamans, Factoryville.
Lancaster,	J. W. Bruckart, Lititz.
Lawrence,	Sylvester Shaffer, New Castle.
Lebanon,	Edward Shuey, Lickdale.
Lehigh,	P. S. Fenstermacher, Allentown.
Luzerne,	J. E. Hildebrant, Dallas.
Lycoming,	A. J. Kahler, Hughesville.
McKean,	E. A. Studholme, Smethport.
Mercer,	Wm. C. Black, Mercer.
Mifflin,	C. M. Smith, Lewistown.
Monroe,	F. S. Brong, Saylorsburg.
Montgomery,	J. H. Schultz, Norristown.
Montour,	J. Miles Derr, Milton, R. D. No. 1.
Northampton,	C. S. Messinger, Tatamy, R. D. No. 1.
Northumberland,	I. A. Eschbach, Milton, R. D. No. 1.
Philadelphia,	David Rust, Horticultural Hall, Philadelphia.
Perry,	C. M. Bower, Blain.
Pike,	B. F. Killam, Paupack.
Potter,	A. T. Crittenden, Oswayo.
Schuylkill,	John Shoener, New Ringgold.
Snyder,	F. F. Glass, Freeburg.
Somerset,	Robert W. Lohr, Boswell.
Sullivan,	E. R. Warburton, Campbellville.
Susquehanna,	F. A. Davies, Montrose.
Tioga,	C. H. De Witt, Mansfield.
Union,	J. Newton Glover, Vicksburg.
Venango,	W. A. Crawford, Cooperstown.
Warren,	G. A. Woodside, Sugargrove.
Washington,	Jas. M. Paxton, Houston.

County.	Name and Address of Chairmen.
Wayne,	W. E. Perham, Varden.
Westmoreland,	W. F. Holtzer, Greensburg.
Wyoming,	G. A. Benson, Tunkhannock.
York,	G. F. Barnes, Rossville.

LIST OF INSTITUTE LECTURERS FOR SEASON OF 1914-15.

Anderson, H. M., New Park, Pa.
Barnitz, C. M., Riverside, Pa.
Bond, M. S., Danville, Pa.
Campbell, J. T., Hartstown, Pa.
Card, Fred W., Sylvania, Pa.
Conard, Dr. M. E., Westgrove, Pa.
Cooke, Prof. Wells W., U. S. Department of Agriculture, Washington, D. C.
Darst, W. H., State College, Pa.
Dorsett, E. B., Mansfield, Pa.
Fassett, F. H., Meshoppen, Pa.
Faust, S. L., Hoboken, Pa.
Funk, Sheldon W., Boyertown, Pa.
Gooderham, H. M., Patton, Pa.
Groupe, J. Stewart, Jersey Shore, Pa., R. D. No. 4.
Herman, J. A., Fombell, Pa.
Herr, John D., Lancaster, Pa.
Horrocks, Wm., Souderton, Pa., R. D. No. 1.
Hulsart, C. C., Matawan, N. J.
Kline, Frank, Spring City, Pa.
Lighty, L. W., East Berlin, Pa., R. D.
Lyons, Dr. Hannah McK., Lincoln University, Pa.
Mairs, Prof. T. I., State College, Pa.
McCallum, M. H., Wernersville, Pa.
Menges, Prof. Franklin, York, Pa.
Mitman, Howard, Hellertown, Pa.
Noll, C. F., State College, Pa.
Orton, C. R., State College, Pa.
Patton, W. M., Mosgrove, Pa., R. D. No. 2.
Phillips, E. L., New Bethlehem, Pa.
Phillipy, Dr. W. T., Carlisle, Pa.
Putney, Fred S., State College, Pa.
Rabild, Prof. Helmer T., U. S. Department of Agriculture, Washinton D C
Row, Chas. A., Yardley, Pa.
Seeds, Robt. S., Birmingham, Pa.
Smith, R. S., State College, Pa.
Stout, W. H., Pinegrove, Pa.
Struble, Vern T., Athens, Pa., R. D. No. 24.
Tomhave, W. H., State College, Pa.
Van Noy, Leon Otice, Troy, Pa., R. D. No. 66.
Watts, D. H., Kerrmoor, Pa.
White, John W., State College, Pa.
White, W. R., State College, Pa.
Wittman, W. Theo., Allentown, Pa.
Worthen, E. L., State College, Pa.
Wrigley, Paul I., Eddington, Pa.

PAPERS READ AND ADDRESSES DELIVERED AT THE ANNUAL MEETING OF THE FARMERS' NORMAL INSTITUTE, HELD AT EXPOSITION PARK, PA., MAY 25-27-1915.

ADDRESS OF WELCOME

By JAMES E. REANY.

As President of the Board and on their behalf, I wish to extend to each and every one of you a most cordial welcome. We feel especially proud to have you among us and trust that your stay will be one to be remembered. We especially appeal to those members who have come from some remote part of the State, because we are very proud of this particular section and of our beautiful little body of water here, which we feel is unsurpassed in natural beauty anywhere in the country; and those who come from the eastern part of the State, where water is rather a scarce article, we want you to carry back with you a lasting remembrance of this place.

I feel that there is a wonderful opportunity now for the farmer. It seems to me that the United States very soon will become the granary of the world. An agricultural buying movement no doubt will soon be inaugurated that will be stupendous in character, and it behooves every man of agricultural inclination, to set himself about the task of "setting his house in order," in order to provide himself with all the knowledge and apparatus necessary to promote the agricultural interest of this vast country. Europe, being devastated by war as it is to-day, is reduced to a very unproductive state, agriculturally, and I believe that this country is destined to supply the sustenance of the world in no mean degree, and it gives me personally a great deal of pleasure to commend to every man the excellent work that these institutes and the Board of Agriculture are able to perform.

It is absolutely necessary that everyone pay some attention, some heed to agricultural pursuits. The day has passed when things are being done as our grandfathers did them. The schoolmaster has been abroad in this country and it is essential that we all appreciate that fact. We all realize that we have a great many men in our several bureaus of agriculture devoting their time and their energy to the advancement of this fundamental industry, the primary work of any country, and I trust that this meeting will be productive of an immense amount of good; that you will all carry back with you something to be remembered, some information of a useful character, something you can apply to your everyday needs, and that you will carry with you also a remembrance of our beautiful little resort. I bespeak for every man, on his part, his hearty cooperation and good will in the furtherance of this convention.

ADDRESS OF WELCOME

By HON. R. C. McMaster, *Adamsville, Pa.*

Mr. Chairman, Ladies and Gentlemen of the Farmers' Normal Institute: I am glad to have the pleasure of saying a very few words of welcome to you to-day. Being introduced to an audience always reminds me of an old story that I heard related of Josh Billings. Josh Billings was a humorous lecturer of some years ago and he was engaged by a club down at Plainfield, N. J., to deliver a lecture, and the club had selected a young man of great ambitions to introduce Josh to the audience. When the time came for the introduction, the young man appeared all togged up in great shape and seemed to think a great deal more about himself than he did obout Josh, and he commenced in this way, becoming somewhat confused as to what he was there for, said: "I am not Josh Billings, nor his wife, nor his son, nor his daughter, nor his man servant, nor his maid servant, nor his ox"—and there he stopped and left old Josh to wade out.

My friends, it is my pleasure indeed to welcome you to old Crawford county. We feel proud of old Crawford county. It is written of the county that it has been the best dairy county in the State of Pennsylvania. We welcome you here. We welcome you to Conneaut Lake, the most beautiful and the largest lake in the State of Pennsylvania. We welcome you here for what you represent, the whole State of Pennsylvania, which is a good deal. We welcome you for the purpose that you come here. You come here for the exchange of thought which elevates mankind. You come here, as I understand, for the diffusion of knowledge along the line of farming, which has done so much in the past for the farming interests and will continue to do more in the future.

The farming interest is the greatest industry in the world; it has been so since Adam hid behind the apple tree, and will continue to be so. It is the industry upon which all other industries, great industries, are founded. It is the foundation of all other industries, and it is the industry that feeds the world and will continue to feed the world, and we trust that your meeting here will be profitable along this line, the exchange of thought which helps along, which has done so much in the past. As one item occurs to me recently, I can remember in these beautiful valleys and hills of ours here at this time of the year when your meadows were red with soil, ruined with soil, that would not produce one quarter of a crop and farmers that I talked with did not know what to do and had no remedy to overcome it at that time, but now, through influences just like you exercise, the distribution of knowledge, the diffusion of knowledge, that has all been overcome to a great extent and these same meadows now are producing bountiful crops. This is only one result of one item of your line and there are many and we are pleased to have you work along this line. We hope that your meeting here will be pleasant and will be profitable to all, and we welcome you to Conneaut Lake and Exposition Park, to our magnificent hotels, and trust that you will go away pleased that you came.

ADDRESS OF WELCOME

By J. T. CAMPBELL, *Hartstown, Pa.*

Yes, I did want to say a word of welcome to you people and my friends, I am sure, and I have no speech—I did think a while ago I might get up a little speech for this occasion but I thought I might spill over, so I haven't any speech at all. I did make out a few notes as I was sitting here listening to the others on this welcome.

In the first place I want to say that I welcome you here, first and foremost, for the manhood and womanhood that your represent. I have reason to believe, I believe I can safely say that I have a personal acquaintance with every one of you, and I know whereof I speak in that respect and because of the sterling qualities of manhood and womanhood that your represent, I welcome you to Crawford county as a farmer; we need you, we need men like you, we need your influence here as well as the things that you have that contribute to better farming because it is not all of the subject of farms to go out and be a better farmer and till the land a little better than it has been tilled before; far from it, and we know that the great work of the Farmers' Institutes in Pennsylvania has not stopped there. And let me say to-day, while we are in a section of Pennsylvania that is more newly settled, not quite as old a country as the part of the State on the other side of the mountains from which many of you come, I want to assure you that the Indians at the present time in this section are all peaceable, as far as that goes, you need have no alarm in that direction.

I do want to say that we have a good country here, not as well developed as it might well be in the future, without any doubt. I have traveled about a little, studying agricultural conditions and have been in almost every county of the State and in almost every county of two or three other states and I can safely say that I think we have a land here with great possibilities, much of which has not been fully developed. Not a great while ago I spent a week in northern Illinois and visited many farms, and the farmers told me their land there would bring $200 to $300 and acre readily. Our land is not bringing these prices; we have fairly good land, not so well improved perhaps, but it can be bought at $50 to $60 an acre and you can spend $50 an acre more on it in the way of drainage and improvements and have land at a cost of $100 an acre that I feel perfectly safe in saying will yield more net profit to the acre after the expenses are taken out than the $300 an acre land in northern Illinois will yield, as far as agriculture goes. So we need men to develop these possibilities to a greater extent than they have been developed in the last few years.

We welcome you because you have brought better agriculture and better home conditions, the things that really amount to so much. You are in a land to-day where a large percentage of the farmers own their homes and have them paid for. You do not find the fat of the land oozing out as readily as in Lancaster county, but they get the results nevertheless. You can go into many many homes in western Crawford county to-day, though they are not pretentious, though they are not mansions or palaces, and you will find all the modern conveniences in the way of modern heating appliances, good lighting systems, bath room equipments and all those things. We do not need to be told that there are a whole lot of us who need these things, we realize that and we know the blessings that go with them. What we need is some help to tell us how to acquire some of these things; that is the problem we are up against to-day. It is illustrated by the fact that when milk in this county brought a little less than three cents a quart, good Jersey milk, that not far away is bringing eight and ten cents from the consumers—we need some of that profit and we will have more when we get our share. One of the great things we are up against in western Crawford county, is the question of who is going to help the farmer win his battle. That is the question that is coming up for solution. We believe to-day that the organization that you represent is going to have a part in that direction, must have a part in that direction. We welcome you here then because we believe you are able to help us in that direction and we look to you for some help along these lines.

Then, further, I want to say, personally, that I welcome you here because of what you have been to me as brothers and sisters in this work. I do not have to go back very many years in my life till I recall the time when I started out to try to do a little Farmers' Institute lecture work and my first attempt fell rather flat and I realized that I was a failure along that line and wanted to give it up and friends like Brother Lighty and Brother Seeds took me and stood my feet on a rock along these lines and I shall always feel under an everlasting debt of gratitude for their help and strength in that direction and the help that comes from all of you in this great association work. And again I should have been very much pleased if it had been possible, by some arrangement, that I could have had you all over to Woodbine Farm for a short time at least, but it did not seem possible to make an arrangement of this kind, but I hope that many of you as possibly can will find it convenient to make a short visit at least before your return to your homes and we shall be glad to see any and all of you who can come. We are not doing great things over there, not running a show place or anything of that kind, but we have accomplished some results by patient effort and hard work along the lines we have been working in the past few years and we feel that our work is only well begun.

It is sometimes said that a Farmers' Institute lecturer ought to be a good farmer, and so he should; but a man ought also to be a good farmer because he is a lecturer. It is a rule that works both ways and I feel when I go out into the work of the Farmers' Institutes I endeavor to put into my work the very best that I can. I feel that my efforts are feeble along that line many times, but I oft-times feel that if I were able to give to the State of Pennsylvania and its agriculture and those with whom I come in contact, as much as I have received in the work, then I should feel that I have accomplished a great measure of success; but I am sure I will never be able to give out as much as I have received. in this work. If you will come over, any and all who can, you will find a hearty welcome when you come to Woodbine Farm and we are trying to put into practice there the results of what we have found out in our work on the farm.

Let me say in closing. In my contact with institute work in the State of Pennsylvania, in my contact with institute workers in quite a number of other states, I can safely say that I think in broad-minded spirit and in ability to look at the great questions of agriculture from every side, that I know of no body of men and women in this country to-day that take the broad-minded and all-sided view of the great agricultural questions that is taken by the great agricultural institute workers of the United States in general, and I know that that especially holds good in the State of Pennsylvania. I am not going to find fault with the specialist or anything of that kind. The specialist is a useful man and has accomplished a great work in Pennsylvania and in this country to-day but you know and I know that many times the man that specializes intensely, where he may know a whole about his particular special line, it is not always possible for him to see the relationship of his special problem to the other problems in general and because of his inability to see his proper relationship in this light, he does not grasp the full situation sometimes that is grasped by the man who does not devote himself so closely along one special line.

Now a word as to the future work of the institute. I hope that this meeting here—I know this work will be constructive because we have great opportunities and great possibilities along this line and great problems yet to be worked out and great work to be done by the Farmers' Institute workers of the State of Pennsylvania. I am aware in some states that there are those to-day who would undertake to say that the Farmers' Institute movement of our country has accomplished its work and should be abandoned. A few months ago I heard a man undertake to hold the funeral obsequies of the Farmers' Institute work of the United States, and right then and there I was reminded of that old saying of Gordon Graham, that the first requisite of a quiet funeral was to have a willing corpse, and you know as well as I that the corpse in Pennsylvania is not by any means willing. We welcome you because of the work yet to be done by the Farmers' Institute of Pennsylvania. I want to welcome you, County Chairmen, because of the many kindnesses and courtesies you have extended to me as I have been with you in the various counties, and perhaps there is not another State in the Union to-day that has a similar body of men, willing to serve without pay, giving one to four weeks of their time to the advancement of the agriculture of our great Commonwealth without any pay whatever, in order that this work may go on. It certainly speaks well for the Commonwealth of Pennsylvania, it speaks well for the future of agriculture that Pennsylvania is able to have a body of men like this, and as I have mingled with you remembering the many kindnesses and courtesies that you have shown me I extend a special welcome to western Crawford county. I know there are times when this Institute work does not move along as smoothly as it might and the county chairman gets a whole lot of blame too, but it is the man that does the best that gets more kicks than all the rest and after all a man that does something is always going to get some kicks, if there is any consolation in that, you have it.

So with these remarks—and there are other things that I might have said—but do not forget that we extend to you a most hearty welcome here at this time and want to take part in this meeting and want to go out from this meeting the very best results that have ever gone out from a meeting of this kind and as far as we are able at least to contribute in that direction, we are going to do it. Many of the mistakes we make—and we will make them and always have made them and you are going to make them—they are mistakes not of the heart at least, and just consider them in that light, and so we extend to each and every one of you both lecturers and county chairmen and all of you a most hearty and most cordial welcome.

RESPONSE TO ADDRESSES OF WELCOME

By HON. A. L. MARTIN, *Director of Institutes*

Mr. Chairman and gentlemen who have so generously offered us everything that is in and around Conneaut Lake and extended us a hearty and generous welcome; I may say that in traveling over Pennsylvania for the past 16 years I have sometimes been led to think, at least, that if there was a possibility of partiality not on the part of the Lord in the blessings that he bestows upon his people, it was first that we were given a home in a state like Pennsylvania; and then again after looking more closely into the various conditions, educational, social and along broad agricultural lines, I have been led to know that in every single county of the State there seems to be some special benefit bestowed not quite common to the other counties. And now as we come into Crawford county, I have been led to believe, not only to-day but upon other occasions, that if that partiality were at all possible that Crawford county was blessed at least in some things beyond most of the counties of the State of Pennsylvania.

What are some of these things? First, Crawford county has the advantage which some other counties do not have, of access to a higher education by your educational institutions; it has access to as good, if not the best, common schools within the State, and you have a soil, or rather I should say, you have farm homes unexcelled, except by the most costly, but real farm homes unexcelled by any other county of the State. And more than that, you occupy one of Nature's beauty spots in Pennsylvania where we are holding this meeting; the largest inland water of the State is here, beautiful in all its surroundings and a piece of water of utility as well, where we can come from all the counties and all parts of eastern Ohio and western Pennsylvania, and where the teeming multitudes in our cities seek constantly for a place of wholesome recreation. Here, at Conneaut, is one of those beauty spots that Nature has bestowed upon you for your benefit and for the benefit and uplifting of mankind.

Now, my friends, what should we say of the outlook? Agriculture—what is it? What does it represent to-day? Do you not know that it has a broader horizon, it has a brighter prospect than ever before in its history? Do you not know that every thinking man and woman to-day in this country of ours is thinking and writing and talking about the farm and farm life? What does that mean? Some of these Associations have undertaken, even though they exist in cities and towns, the task of giving us farmers an uplift. We are pleased with the thought. We are pleased with the knowledge, that at last the whole world has come to its proper senses and that it is admitted and proclaimed that the occupation that we represent here to-day is the one great occupation upon which all mankind, all trades, all industries and pursuits must look for their own upbuilding. Does that, my friends, give you any conception of the vast responsibilities that rest upon you and me and every man and every woman who cultivates a foot of God's earth?

What are some of our responsibilities? I should say that the man who is year by year cultivating that acre and not improving its productive power and force is not living up to his divine commission. The man upon one of God's acres here to-day in Pennsylvania that is not increasing its powers is in some sense robbing God's earth; and we are here to-day, my friends, to devise ways and means by which we may magnify the powers of the acre. We are here for greater things than even that. The improvement of the soil comes first of course. Then there may come another improvement; the greatest improvement that can come to the farmer life of Pennsylvania, is to improve the social, the educational, and, if you will, the spiritual life upon the farm. What are the agencies? The school. What should it be? When I say the school, I mean that school that you and I attended when we were boys and girls. I mean that country school and that country schoolhouse. Do you know that more depends this day and age and generation in which we live, upon the mental and moral equipment of that boy and girl than any other one thing that you can name? I sometimes think that we have gone to a little extreme in the direction of looking after the animals on the farm and the crops on the farm and the disposition of the same—that we went a little too far, further than we have gone in looking after the conditions of the schoolhouse and equipment of that school and the preparation of our children and their equipment to fight the great battles of life as they will be called upon to meet them.

Then there is that other thought; the social side of our lives. We farmers, amongst all the other occupations and businesses of life, live our lives in a certain measure separate, as it were, the one from the other. Oh, how important it is in all this work that we have community interests somewhere, the social center somewhere, handled and governed and controlled by the wisest and most discreet men and women of all that community, who shall lead along and lead up the youth of that community to a desire for the highest order of social life in that community. Do you think of all these things in that way?

Then again that other part, and I ought to call it the part performed by the country church. It has been my privilege for the past 16 years to travel up and down and all over Pennsylvania—indeed I can see its beauty spots here and there all over the State—and consider these things; and Sabbath Day, as my custom is, I go into the country church where I am stopping and have observed some things; I have observed that the attendance at that little country church has been for years on the decline and is to-day less than it was a decade or two ago. What is the reason for all this? Are we not a pious people? Do we not love spiritual things? I cannot believe that we do not. But what is the reason for the decline in the attendance in that country church? I will give you a thought upon that: It is that occasionally, and I do not want to censure the ministry, far from that, my own mother taught me better than that, but one of the reasons, in my judgment, for the decline in the country church is, that a certain proportion of the ministry in these country churches have never studied the interests and principles of agriculture. Why sometimes I have heard these ministers undertake to pray as men of prayer and their prayer breathed not the spirit of the husbandman but rather an excuse for it, and if the day comes, my friends, when the country church will occupy the place the Lord intended it should occupy in agriculture, it will be when the ministry thereof have made a study of the great principles of agriculture, and they can live and act in a sphere of sympathy with the great work in which you and I are engaged, and that church will become not only a religious but a social center, together with the schools of the country, gathering in the young and the old in one grand social and religious action. Then, together with the knowledge attained through the study of the great principles of agriculture by the great organization of Farmers' Institute workers and other agencies, then may we expect, my fellow farmers, to have agriculture stand up as a beacon light to every other industry and occupation as the one occupation blessed of God and sanctioned and upheld by all other industries, and we ourselves having the highest conception of the noblest work ever entrusted to mankind.

But I want to turn again to this beautiful, splendid Crawford county. You have some things here in great abundance. You have a soil easy of cultivation, ready of response to your touch; but you need some things that you do not have, in my conception of the matter. If the farms of Crawford county were underdrained as they should be, every acre of all these farms in the county would double its production. Do you believe that? They would double their production. Hence, I am firm in stating, first, underdrainage; then careful cultivation. But I guess you are going to get more water over here pretty soon and I don't know what to say about it; but I do say that if I had the privilege of the cultivation, after it was underdrained, of Pymotuming Swamp for ten years, I was going to say I would pay the National debt. But I am going to say to you that your thousands of acres in that, embrace land than which in the United States there is not a better prospect for growing the vegetables that the world consumes, than this old swamp, if it were underdrained; but you are going to cover it with water to help feed some splendid manufacturing plants. That looks all right. But here is the question for you to solve; if you underdrain it you will get all the water that is there, won't you, and let it run down into the Shenango and let us dam the Shenango and cultivate this splendid outlook for old Crawford county. That runs a little counter to some teachings. It is my conception of it, that is all.

Gentlemen of Crawford county, you have your own problems to solve. We are here as an organization of the Farmers' Institutes, representing a part of the State Government of Pennsylvania to help you with any of the problems you have. The sessions of this Institute will be open until Thursday night and we trust that you will bring these problems here and let them be freely discussed. This is no star chamber association, it is for open and free discussion of all the great problems that confront us in agriculture.

Now, my friends, I have talked altogether too long. I suppose I will talk a good deal more at some other sessions of this meeting; but we are indeed gratified to receive so generous a welcome from Crawford county and we are glad to meet on this beautiful location and I am sure we will all go away feeling that it was good for us to be here. I thank you.

ADDRESS

By L. W. LICHTY, East Berlin, Pa.

Director Martin, Mr. Chairman of the Chamber of Commerce, Mr. McMaster, Mr. Campbell: I certainly want to thank you very heartily, thank you for myself, and thank you for the State Board of Agriculture, the members of the Institute Committees of the various counties and Institute lecturers for your kind words. You know words of welcome when we come into a strange country are always very pleasant. Nevertheless, I want to say that I do not feel as though I was in a strange country; I rather feel at home in Crawford county, possibly because about fifteen or sixteen years ago I came to this county the first time I was far away from home, because I am from that distant county—had never been across the mountains—but the people of the western counties and particularly the people of Crawford county, treated me so royally that I felt at home and I kind of feel at home to-day; I almost felt at home yesterday, even more so to-day, because the sun is shining warmer to-day than it did yesterday and even that is welcoming us as well as your bright smiling faces.

Now I have no speech prepared; I am glad I haven't; I can only second what has been said so much better than I could possibly say it and I do want to say that I am very glad to see so many of the old friendly faces here this afternoon and I want to say to these people at Conneaut Lake Exposition grounds that you are welcoming some of the good old war horses of agriculture in the State of Pennsylvania, men who have worked for many years, not including myself, please, but quite a number of the old members of the State Board, the old County Chairmen that I have been working with side by side for a number of years, and when you welcome those old war horses in the agricultural world of Pennsylvania, you are welcoming mighty good men. And members of the State Board, as it has been stated already, are in this work for the love of the work, they do not expect any pay and they do not get any pay. They spend a week, they spend two weeks, they spend a month in real, genuine hard labor in the upbuilding of the agriculture of their various counties. The President of the Chamber of Commerce called our special attention to the great amount of water, this beautiful large sheet of water, and from what he said, I think that he possibly is laboring under a misapprehension; he imagines that we do not have such a great abundance of water over in the eastern end of the State. While it is not a quiet body of water, we have a broad stream about one and a half miles wide flowing down through the eastern half of the State and we have a great abundance of it continuously. Maybe that is explained because we do not drink much of it over in the eastern part of the State. But we are glad to be welcomed over here into your very beautiful country west of the Alleghenies, particularly in Crawford county. I think that really it is the heart of the country west of the Allegheny Mountains.

Now, I believe you are going to have a first class good meeting I do not want to consume too many minutes of your time. You have a splendid program. You have a free platform as was stated by the Director of Institutes and that is the good part of the Farmers' Institute and the Farmers' Normal Institute, the free platform where you are at liberty all the time to ask questions and I hope you will make good use of the time and your privilege. Again I thank you, thank you sincerely for the cordial welcome that you have extended me.

INFECTIOUS ABORTION

DR. C. J. MARSHALL, *State Veterinarian.*

Among the many perplexing diseases that afflict our livestock, the subject selected for consideration to-day is one of vast economic importance. It has been conservatively estimated that infectious abortion exists in about 20% of the breeding herds in this country. Practically 50% of the pregnant animals in newly infected herds abort. In some cases as high as 100% have been known to abort in certain years. The losses in young animals year after year in infected breeding herds are placed at 20%, and the money losses in infected herds is averaged at about $35.00 per head. In dairy cows that abort there is a decrease in the amount of milk produced. The act is likely to be followed by temporary or permanent sterility, udder diseases, septic condition of the uterus and a total loss of many calves.

This form of abortion has been known to be infectious for more than a century. The "Complete Farmer," an agricultural paper published in England, speaks of the disease as contagious as early as 1807. Sensible advice was given in this article in reference to its spread and how to control it. Professor Bang, of Copenhagen, who has done so much good work on many important diseases of animals and especially tuberculosis, discovered the true cause of the disease in 1896. The organism that causes it has been named the bacillus of Bang in honor of its discoverer. His discovery has since been verified in many countries. It has been found in practically all countries where cattle are kept. True infectious abortion in cattle is always due to the bacillus of Bang. The disease is found in nearly all species. In animals except bovines, however, the dissease is not due to the bacillus of Bang. True infectious abortion of cattle has been transmitted experimentally to other species but under natural conditions that of one species of animals is not carried to another. It is uncommon to find two or more species of farm animals afflicted with infectious abortion at the same time. The disease is of the most importance in bovines. Mares are not seldom afflicted with a form of infectious abortion in the horse breeding sections of Pennsylvania. Abortion in animals has been recognized for centuries. In the XXXI chapter of Genesis, the 38th verse it speaks of sheep and goats casting their young. The condition is not always due to infection. Isolated cases are usually due to fright, injury, certain poisons, diseases like anthrax, foot-and-mouth disease, excessive activity of the milk gland, etc. The relative frequency of infectious abortions as compared with those due to accidental causes has been observed by one veterinarian who kept a record of three hundred cases. He found that two hundred and eighty were due to infection and the balance to other causes.

Breeders frequently speak of the condition as slinking, slipping, casting, picking, etc. The disease is easily recognized in a herd. It is not so easy to pick out the infected animals. The diagnosis is usually made by the history. Where several animals abort during the season and no other cause can be found, one is usually safe in judging it to be due to infection. It may occur any time during pregnancy, but is most common from the fifth to the seventh month. The average period of gestation at which 240 cases aborted was 6¼ months. Young cows are more liable to abort than the older members of the same herd. Other valuable observations made on the 240 head of aborters showed the average age at which it occurred to be 4½ years, 8% aborted a second time, 2% the third and 168 retained the afterbirth. No symptoms are observed usually till just before the act. They vary to a certain extent with the period of gestation. In the early stages no clinical symptoms may be detected while toward the end of gestation they simulate more closely those of normal parturition. The calf may live any time after the seventh month of the period of pregnancy. Seven months calves are said to be more liable to live than those dropped at the eighth month and usually thrive better. Aborted calves are, as a rule, ballers, thrive badly and die or should be destroyed as worthless.

In order to detect infected individuals in a herd, laboratory methods are useful. Many different plans have been tried, but up to the present the best results have been obtained by an examination of the blood or what is known as the complement fixation test. It has been possible with this test, to detect practically all of the infected animals in a herd. To do this work properly it is necessary to have a laboratory well equipped and a man especially trained in bacteriology. Our State is fortunate in being provided with the necessary equipment for studying this disease and many others that are difficult to diagnose. In large breeding herds where the owner desires to eliminate contagious abortion, this test is practically the only alternative. By its use infected animals can be segregated from those that have recovered or that have not yet become infected.

It is possible to establish a diagnosis of the disease in a herd from a post-mortem and laboratory examination of the foetus, foetal membranes, etc. In formation obtained in this way is too late to be of practical service.

In order to control the disease it is necessary to consider the various ways in which it has been spread. There are several important factors. It should be remembered that the bacillus of Bang is the only cause of the disease in cattle; that it lives, thrives and multiplies in the foetus, the fetal envelopes and uterus, and that it lives but a short time outside of the pregnant animal. This is one important reason for not breeding infected animals for about three months from the time abortion occurs. The most usual form of introducing the disease in a herd is in the purchase of new cows. It is possible, however, to get the disease from the male. It is spread in a herd principally by feed that is contaminated with the infected foetus, fetal envelopes or vaginal discharge. Professor Bang was the first to discover the fact that the disease is spread by the food. The surest way in which it can be transmitted is by intravenous injections. In this way it has been possible to discover important facts in reference to the period of incubation. The time from which virulent material was injected into the blood to the time of abortion has varied from thirty-three, to two hundred and eighty-one days. The average in ten cases was one hundred and twenty-six days. Artificial infection is believed to produce the disease more quickly than where it is contracted under natural condition. An infected animal may abort before she is placed in a herd and still carry the disease to the new herd, or she may be infected at the time of purchase and carry the foetus for several months and then abort, other animals in the herd may then follow in from six to eight months. When the disease is once introduced into a herd it will remain for years unless necessary measures are adopted for its extermination. There is no doubt but that a certain degree of immunity is carried; it is unusual for animals to abort the second time and still more so the third. Where nothing is done to check the disease the old members of the herd cease to abort and it is confined principally to the heifers and will continue in them from year to year.

As a result of abortion, disagreeable complications may occur. Animals that carry their calves to five months or more are frequently afflicted with difficult parturition and assistance is often necessary to deliver the calves. Milk fever seldom occurs after abortion but has been observed in certain cases. Retention of the afterbirth is not unusual and if not properly treated it may result in inflammation of the genital organs and even death of the animal. In some cases inflammation of the udder, or what is commonly known as garget, follows as a result. One of the worst complications in contagious abortion is sterility and many otherwise valuable cows cease to breed. This may be temporary or permanent.

It is possible to prevent or exterminate this disagreeable disease, yet it is necessary to exercise care in doing so that is beyond the ability of the average breeder. One common mistake that is frequently made is to sell animals that abort. This is locking up the stable after the horse is stolen. It is considered better in most cases to keep such animals and take advantage of the immunity that has been produced. In small dairy herds it may not be the best form of economy to spend the money and effort necessary in exterminating the disease. In breeding herds it will prove the ruination of the business if it cannot be checked. One should exercise extreme care in purchasing new animals. It is not advisable to use the same bull on several herds. The animal that aborts should be isolated and kept isolated so long as there is a discharge. This may disappear in a week or may extend for a month or more. Aborting animals should not be bred for about three months in order to give the organisms that produce the disease time to die under normal conditions. The foetus should be disposed of in a way that it cannot spread the infection; it may be covered with fresh burned lime, chloride of lime, buried, boiled or burned, but should not be allowed to remain on the pasture, in the barnyard or any place accessible to cattle, other animals or man. The same is true of the afterbirth. The vaginal discharge is equally as infectious. For this reason it is best to keep the animal confined and not permit her to travel over pasture fields or territory on which susceptible animals are allowed. During the first few days vaginal douches are useful Various remedies may be used for this purpose. One of the best is a one-half of one per cent. solution of lysol in warm water. It is prepared by adding two tablespoonsful of lysol to five quarts of warm water. This amount should be administered once daily from a vaginal douche or a fountain syringe for about the first week and continued longer if any discharge is observed. The posterior parts of the cow should be kept clean with a solution of the same strength. The droppings from the animal should be covered twice daily with fresh burned lime, chloride of lime, a saturated solution of bluestone, or some other good disinfectant. The animal is considered fairly safe to be placed with the other animals as soon as the discharge ceases. It is important to be certain that the discharge has stopped permanently.

In a breeding herd where the disease has become established it may be advisable to detect by laboratory examination, if possible, those that are infected, and separate the infected from the non-infected. Practically the only treatment in these cases is to keep the two groups separate and treat any that abort as described above. The heifers should be kept apart from the main herd and a special bull kept for service for them.

It should be remembered that there is no specific medicine that will cure contagious abortion. There are many patent medicines on the market and in many cases their merits have been over-estimated from the fact that natural immunity has been the cause while the medicine received the credit. In certain cases good has been accomplished by the use of advertised treatments for the reason that isolation and sensible advice has accompanied the use of the medicine. Recently considerable attention has been given to the use of medicated methylene blue. This treatment has been tried extensively under the direction of the State Livestock Sanitary Board. Some breeders have reported good results from its use but it is believed that in most cases this is due to a mistaken idea as numerous cases have been observed where equally as good results were obtained with as without this treatment. The carbolic acid treatment has been advocated more extensively than the medicated methylene blue, and some good observers have ascribed some benefit to this remedy when used either subcutaneously or by the mouth. In 1905 the English Board of Agriculture appointed a Commission to make a special study of this disease and among other treatments carbolic acid was given a trial. The report of this Commission shows no benefit derived from the treatment, and this is the concensus of opinion among those best qualified to judge.

The danger of transmitting the disease from the bull is not so great as at one time was believed, yet in exterminating the disease from a herd it is necessary to give consideration to the male as well as to the female. No symptoms are usually observed in the bull yet he is likely to transmit it. It has been decided that clipping the hairs around the prepuce and using the same injections as recommended for the cow is advisable. This should be done especially where bulls are used in more herds than one, or in other herds that are not known to be free from disease.

In considering the subject of infectious abortion, special attention has been given to the disease in cattle for the reason that it is of much more economic importance in this species. It should be remembered that a form of infectious abortion may be found in nearly all species of domestic animals and when this occurs the prevention and treatment recommended for cattle will apply equally as well to others.

ADDRESS

By ROBERT S. SEEDS, *Birmingham, Pa.*

Mr. Chairman, Ladies and Gentlemen: I want to say to Brother Campbell that I want to thank him from the bottom of my heart for the welcome he has given us coming into this county. I have traveled with him and know him well, and know his county, and I assure you, my dear friends, that the longer I live and the older I get, the more delighted I am to come and mingle with my fellow-men. God help the man who knows it all, and lives by himself; he is to be pitied. And when a man labors and makes some money, instead of laying it up to ruin some boy or some girl, he should get something out of life and become broader and greater and a better citizen for his community and the state in which he lives. Not long ago, my friend Hubbard, who went down on the Lusitania, was lecturing to the bankers of Pennsylvania at Bedford Springs, and said: "Gentlemen, not long ago I visited an insane asylum where the people were crazy. I noticed that a single keeper had a dozen men out walking and giving them exercise, and I went to that keeper and I said to him 'Do you realize the danger that you are in? Suppose these twelve men should get together, they'd hammer the life out of you and run off.' 'Why,' he said, 'you don't know the danger you are in from these twelve men if they would get together: 'Yes,' the keeper said, 'but they can't get together.' God help the people who can't get together. A friend of mine was going from one town to another down south and he and his friend were being hauled in a spring wagon with a mule, and a colored man was doing the driving. He noticed in going along that the old colored man would take his whip and pick a bee off of a leaf, would pick a worm off of a stalk or stem; he was an expert with his whip, and after while he came along to a hornet's nest hanging on a limb and they said, "See, if you can bring that down with a crack of your whip," and the nigger said, "No sir, Boss, dey'se organized."

Now that's what it is to be organized, and nobody has watched this more closely than I have within the last twenty years, and right now I notice in this program that the first topic on this question this afternoon is "Community Breeding"—is that correct or "Community Building?" Well, you could get that community building, and right now, from one end to the other of this great and glorious country of ours, at the Chautauquas, at public meetings of this kind, men are breaking their necks to write an essay or a speech and commit it to memory, starting out to build communities, and I want to tell you, my dear friends, the man who takes the platform to talk the building of a community, I want him to begin using the personal pronoun "I" and stick to it until he is through. There is no place under God's Heaven where a man should begin community building more than right in his own neighborhood, that is the place to begin; let him begin at home. I tell you I am from Missouri, I want you to show me. I want to look at it, and I know they will tell you—they can't tell you, you can't do it. The business men of Pittsburgh, backed up by the Chamber of Commerce, 122 men, visited twenty some towns last week. This evening one week ago, in Altoona, I was invited up to talk at their reception, and in that speech I happened to say, speaking to them of what they were doing, I said I was the first man in Pennsylvania to raise alfalfa that I know of and there wasn't anything that I said to the business men of Pittsburgh that they applauded like they did when I stood up before them and boasted of being the first man to raise alfalfa in Pennsylvania. I say this to show how broad those men are in Pittsburgh. I know the church members at Birmingham, Pa., stood at the Birmingham Church and said, "You can't do it," when I talked about raising alfalfa some years ago. They said, "You can't do it." The scientific men told me not to talk it, that it wouldn't do in Pennsylvania. They said, "You can't do it," just like a man in St. Paul. He was out one evening and met some friends and he got so drunk he could scarcely get home, and he started and on his way home he had to go through the movie district of St. Paul, and going along the pavement, he staggered up to an electric light pole and got hold of it and looked up and saw an electric sign that said, "Home, Sweet Home in three reels," and he said, "You can't do it." Like the poor fellow who went to the hospital, and the operation was performed and he was on the operating table, had come to, and a fire broke out across the street and the Doctor said, "Pull down the blinds, this fellow will come to and think the operation was a failure." Making communities, making them better, that's what we want to do, and not long ago, my friend Lighty took supper at my home which was the greatest pleasure I have had for sometime, but after supper, walking out over our farm which has almost been ruined the second time by a lumber job—we were walking over a mowing field that had the manure on the top of it and he looked at the manure and looked at the elevation we were on and he said: "Seeds, it is mighty expensive to haul this barnyard manure up a hill like this." I said, "It is all right, we can haul it up this hill and put it on a mowing field and not plow it down and beat the man who plows it down," and I haven't seen a mowing field in this great and glorious country—I say to you that I haven't seen a grass field from Pittsburgh to this town this morning that looked as good as that mowing field that has the manure on top of it. That will be mowed and the top taken off and be a better field for corn next year than it was this year before the manure was put on it. Did you hear what this man said about this asparagus, about putting the manure on a year before to get the crop the coming year? Every now and then I come across a man who is turning around and backing up the things I am talking about. Of course, they don't like it. I have been called more liars than any man in the State of Pennsylvania. I like to pose as the biggest liar in the State because I stand in a class by myself. I know they find fault and say they don't like it. I have had it thrown in my teeth dozens of times. A man down in Pittsburgh not long ago, was working for Jones & Laughlin and a friend met him and said, "Are you still at Jones & Laughlin?" "Nor sir." "I thought you liked them, couldn't work any place else." He said, "I like Jones & Laughlin all right. I have been there a long time, but I didn't like the way the boss talked, and so I quit." "What did the boss say?" "Why, the boss said, 'you're fired.'" So my dear friends, the great thing in any line is the ability to come together, and I will tell you that—you can talk about stories and applications, but my friend Peachey told a story that not as long as I live, could I forget it if I wanted to and that is to back up the assertion that I am from Missouri and I want to see it, I want you to show me; that's the question; you can talk about theory, you can talk about how it will look and all that kind of business, but I want to see it, I want to look at it with my eye and Peachey told a story that I will never forget, of the old lady going across the ocean on a ship and she heard them talk about crossing the equator and she went to the Captain and said, "Captain, I hear you are going to cross the equator. I would like to see the equator."

The captain said, "All right, you shall see it; and the day we cross it, I will take you out on the deck and adjust the telescope and you can take a look at the equator." And in a day or two, he said, "Come out on the deck and I will show you the equator" and he adjusted the telescope for her to look through and pulled a hair out of her head and stretched it across in front of the telescope and said, "Do you see that line in front of you?" "Yes, I can see that plainly." And the captain said, "That's the equator" and the old lady said, "I see it plainly, and I see a camel crossing at this time." So I want to tell you, my dear friends, that the man who starts out—I wrote an article for the platform of Chautauqua not long ago and in that article I made the statement that the man who steps on a Chautauqua platform—I know they have been saving us poor country people for years and years and years, but the man who steps on a platform to tell the people how to build a community, I want to tell you, if I am in the audience, I am going to ask him what he has done to build any community in this country. I want to look at it; I want to see it and I want to see it with my eyes.

Right on my own farm where Mr. Lighty was the other day, you can talk about looking at alfalfa all you want to, how it will look and all that, but I like to go out and see it with my eye; I like to see it being cut with the scythe on the 1st of May and put on the wagon and hauled into the barn and see the pigs and the bull and the cattle eat it. I like to look at it; I like to see it with my eye. That is the part that cuts the ice; and I have seen it time and again, and you know what I would do if I had the power? I would go to Harrisburg and go before the legislature and I would say, "Gentlemen, I want so much money to pay the taxes on some farm in the centre of every county; we will pay the taxes on that farm and give it to any young man or any old man that will come out on it, give it to him for nothing and all we ask him is to take the farm and say 'Here, come and look at it and I will show you how to do it.'" I want to see things and I want to look at it, and that's where the particular part of it comes in.

It is nearly four o'clock and I didn't intend to make a speech, and haven't made a speech; I have simply talked to you, but I want to tell you, my dear friends, that as I travel from one end of this country to the other, my heart is getting into this work more and more every year, and getting into the practical part of it, and as I travel over the country I see wherein we can make the communities better if we unite and go hand in hand and shoulder to shoulder. We can make this country better every year, by building and making the communities better.

ADDRESS

By C. C. Hulsart, *Matawan, New Jersey.*

(Exhibiting a bunch of New Jersey asparagus)

It seems to me the easiest thing in the world for a Jerseyman to get into trouble. Now I thought it would be rather nice to bring out a bunch of our Jersey asparagus and I intended it for friend Martin, though I haven't told him so yet, then he goes to work and springs this on me. Now it is just like—friend Campbell will bear me out in what I am going to say—the early chicken that gets out in the morning and goes and catches a worm and brings it back and somebody else takes it away from him. Some years ago I traveled over the State of New Jersey with friend Campbell in Farmers' Institute work and he was just as enthusiastic when he was in New Jersey as he appears to be this afternoon in Crawford county. But there is one thing he cannot do, he cannot beat New Jersey sand growing asparagus and I think he knows it. You haven't the soil, not that I have seen so far in Crawford county; you know that is the beginning. It is practically impossible, friends, to grow that kind of asparagus on clay land, not that it might not be grown as large, but it will be all sorts of shapes and it will come through the soil turned over and leaning several different ways from Sunday. You must have asparagus soil to grow that kind of asparagus. Furthermore, you must have seed from which to plant. Now, everybody knows that; what I am driving at, is just this, you can't go to a seedsman that is dealing in seed commercially and get seed that will grow uniform asparagus.

A Member: Or anything else.

MR. HULSART: Right you are. Now I'm going to give you two or three examples. The first bed of asparagus that I ever grew in my life I applied to an acquaintance for some asparagus seed from his plantation. The answer that I received was that if he had any left when he was done planting, he would be glad to supply me. Now, I was naturally in a little hurry and I could not wait on that fellow, and so I went to the largest seed house in the City of New York and bought five pounds of asparagus seed and brought them home and planted them in the nursery bed and I grew the plants for a year. Then I set the plants in two acres and a half of land and manured it as well as I could afford to, put on commercial fertilizer and attended to it three or four years, lost about seven hundred dollars and then plowed it up and had everything you ever heard tell of from the old asparagus shoots along the seashore to everything you ever heard tell of, except what I bought and paid for, I didn't have a single bit left of true Palmetto. The seed that produced that bunch came from the man I spoke of, the following year; that was cut yesterday forenoon from a bed now starting on its sixteenth year. I did not bring that bunch to advertise anything before this audience at all. I wanted to show a few friends what asparagus will do along the southern shore of Raritan Bay when it becomes 15 or 16 years of age.

The question has been asked, "How long will a bed last?" Nobody knows; some, ten or twelve or fourteen years, and other beds twenty or twenty-five years; it depends largely on the soil and the man who is farming. If the subsoil is porous for four or five feet, an asparagus bed will last much longer than if it has a clay bottom two or two and a half feet from the surface. An asparagus plant has a tendency to come up, and once it gets near the surface, it is almost impossible to get the shoots of size and get them of length. In planting the plants in the field, we plant them in a trench as deep as a two-horse turning plough will turn the furrow going once in each direction, turn it and come back in the same row and plant the plants in the bottom of the furrow. Men have asked me, "Shall we put in manure?" I know men who advocate it and who have had success in doing it, but there is a reason for not doing it. In many instances the asparagus will do fairly well, provided that manure compost is put on the top of plants, but in many instances field mice get under there and dearly love to chew the little roots and we have a ragged plantation.

Never put manure underneath an asparagus plant when you are going to plant it; the plant will start better, grow faster and be a larger plant at the end of one season, if planted on a hard, solid bottom. Some of our scientific writers, some of those who. I suppose never set an asparagus row as long as this hall in their lives, advocate making a little mound of earth with the roots, so that they will spread out in a cup shape. Suppose a man has four or five acres to set; how long will it take to plant them that way? Many things work out splendidly on paper, but when the sun is shining on your back and you get out at six o'clock in the morning and stay until six at night, bent double, that mound question will soon be foregotten. I have been there till my back ached and I set them right on the bottom of the furrow and with no manure. Plant your asparagus, plow it, put on manure and the more the better, all your pocket will stand, if it's twenty-five tons to the acre. I have a bed of asparagus seven or eight years old and there's just a trifle over three acres in it, and I put on forty loads of New York stable manure before I ever plowed it at all. First, I grew them all summer and then plowed them with a two-horse plow away from each side of the row and put a ton of manure to each row in November and then plowed the soil back.

A Member: How much manure do you call a load?

MR. HULSART: 2,200 or 2,300 pounds, practically a ton to the row, is what we put on. It has had two or three applications of manure between that time and now. After we get a certain amount of vegetable matter in the soil, we can grow good crops with commercial fertilizer.

A Member: How is manure out of a mushroom house?

MR. HULSART: In connection with commercial fertilizer, it will be ideal. All you get is the humus making material from that manure; the plant food can be supplied much more cheaply in fertilizers. Now remember this, when we come to feeding an asparagus bed, first we have got a row of plants that takes one year, that is grown in a nursery row, now we have got one writer, W. F. Massey, of Salisbury, Md., who is continually advocating planting the seed where it is to remain, he saves a year. Granted, but if he was to plant four or five acres and then try to keep the bugs off of those young plants and keep the weeds out, I think he would prefer planting them in the nursery row where he would have them in a small space not larger than one side of this hall. When a young asparagus plant comes through the ground nd the asparagus beetle is as thick as we have them in old asparagus sections, two or three or four light on that plant in three hours and it is doomed. What man or what body of men on any one farm can cover three or four acres of land and watch it close enough? We plant them in a nursery row and plant them close by home and turn the poultry loose and you will never have to put on any poison, the poultry will take care of it; then take the plants one year old and you will have the best bed at the end of two or three years. Set them in the field atfer plowing under 10 to 12 tons per acre of manure and set the plants right in the bottom of the furrow, and as soon as those plants begin to grow, put on an applicatin of four or five hundred pounds of good potato fertilizer.

A Member: How deep do you set them

MR. HULSART: About 8 inches from the natural level. I have had friends tell me a foot, but they measured from the top of the furrow. I use a No. 20 Oliver chilled plow. If the soil was 11 or 12 inches deep, I would say, "Go down ten inches, if you can, but never go more than half an inch, if possible, into the subsoil, or the young plants will not thrive." They will not thrive until the roots get up into a soil that has soluble and available plant food in it. We want to keep the root system dawn as far as we can. Every new set of roots comes out on top of the old ones. Now, when they becme abut ⅜, sometimes ½ an inch thick, then that crown is that much nearer the surface; next year another layer comes up on the top. If we have got the greatest amount of feeding surface close to the surface of the soil, those roots will work out where the feed is rather than go down. If we have got the greatest amount of plant food available down these, 7 or 8 inches, that root system is going to stay down there and yu can plow over it and not do a great of damage.

A Member: How old do you let your asparagus become before you begin cutting?

MR. HULSART: I cut it when it is one year old for about 4 cuttings. I set it this April and cut it next season about 4 times or possibly 5; if it has been well cared for and well fed, it is better cut 4 or 5 times than if you didn't cut it at all; it helps to develop the crown.

A Member: How do you control your weeds through the season?

MR. HULSART: By hoeing and cultivation, either the gang cultivator, the one horse cultivator or the hand hoe, and sometimes cutting by hand.

A Member: What do you mean by cutting 4 times?

MR. HULSART: Four different cuttings. For instance, we will cut the first cutting on Monday; when there comes another crop of shoots up, it might be Wednesday or Thursday of the same week, or two or three days later, about 4 or 5 cuttings; the warmer the weather is the faster they come, the less cuttings you want to cut because you want to get more in each cutting, you don't want to rob it, just enough to develop that crown, make it uniform, more buds. Now that coat of manure plowed under there will stand by that asparagus longer than any other application that is put on it.

A Member: Whereabout do you cut the shoots off?

MR. HULSART: Oh, just above the crown and sometimes you cannot always do that, it is down there in the dark; you take your chisel-bladed knife, some use a square one. I have seen growers that use the concave knife. I use a fish-tail knife and the point is notched, ground on one side. I like that for this reason, because in shoving it into the ground, the corner just hits a shoot, draws the knife to the spear and the spear to the knife, and its got to cut off. Now asparagus—right there on that knife question, lest I forget—asparagus never wants to be planted on land that has got stone in it. Any man that tries to cut asparagus half a day on land with stone in it, he wants to leave his religion in church before he comes away because you can't keep a knife sharp and the spears come through crooked. Weeds in asparagus do not harm a knife to get it, but you cannot grow asparagus—from 10 to 25 spears will make a bunch of that size—with weeds on the land. Asparagus is a hungry crop, taking anywhere from 8 to 10 loads of manure to the acre and half a ton of fertilizer and from 200 to 300 pounds of nitrate of soda. Now if we are going to furnish that amount of fertility, and let weeds take out the greater part of it, take out the moisture that the plant needs, the next year the fellow that grew his asparagus separate from weeds, will cut more bunches, larger grass, and the larger the grass, the cleaner the grass, the better looking it is, not only the more bunches he will gather, but the larger price he will receive. I don't know of anything where the appearance amounts to as much in price on the market, as we have to sell ours. In New York City, asparagus is selling from $2 to $3.50 a dozen and the fancier it is, the higher the price. The freight is as much on low priced asparagus as on the medium or high-priced, the only thing that is any higher is the commission. It pays to grow grass as good as we can and as large as we can. We often hear tell of 2,000 bunches of asparagus to the acre. You have heard tell of 100 bushels or more of corn to the acre, but Pennsylvania doesn't average hardly 40 and there is very few men that cut 2,000 bunches of asparagus to the acre; my average is 1,500 on 5 or 6 acres and I find that my neighbors are not cutting any more. Some seasons it cuts more than others. Now I seemed to have created a little thought here and that is one of the objects of a man on the platform. I don't suppose there is a commercial asparagus grower in this audience. If there is, I made a wrong guess, but I said I have created thought, and if you will ask any questions along any line of asparagus growing, if I am able, I will try to answer them.

MR. ROW: Won't it push through air sooner than through that extra amount of dirt? You said you wanted it white and we want it green.

MR. HULSART: No, but you have got to let it stand longer before you can cut it, and if you are an asparagus grower, Mr. Row, you know this, when an asparagus crown sends up 4 or 5 shoots, it does not send up any more until you cut them. If we cut ours to-day, we start a new crop. If you don't cut yours until to-morrow, you don't start a new crop until to-morrow, and the closer and oftener you cut it, the faster you start the new ones, and furthermore, it takes more shoots to make a bunch of green grass than of white. It is like putting a piece of hot iron through a rolling mill, the shoot gets smaller every inch it makes up after it comes out into daylight. I'd like to grow green grass, but I am in an asparagus section where you can look in any direction and see 3 or 4 or 5 acres of asparagus and anywhere from 30,000,000 to 40,000,000 bugs at certain times of the year, and these bugs will soon spoil the grass and that's what sells the grass, the tops.

A Member: Could you renew a bed that has been neglected in the way of feeding and might be 10 or 12 years old? Could you renew that by an application of manure?

MR. HULSART: If the crowns are not too near the top. If it is only a garden plot, I would say yes, but if it is for commercial purposes, you have got to cut the grass so near the level of the surface of the land, that I am afraid you would have trouble even though that is green grass. The knife is thrust under the ground a little way and as soon as the crown gets up level with the surface when the knife is thrust in, you are all the time pricking the crown with that knife and damaging the buds. These that you damage a little start to grow and come up and you grow crooked, deformed spears and all that is waste. I'd rather have the manure down the centre of the row as deep as you can put it and if it goes right in between the rows, it doesn't make much difference. I want the greater part of my soluble fertility put on after the cutting season is over. No amount of manuring early in the spring will do that cutting any good. You are manuring for next year's crop. You cannot form plant food that will build cellular tissue until you have got a green top, and as long as you are cutting the shoots every day, you have no green top. The greater part of the manuring should be after the cutting season ceases, and you store up fertility for the next season; at the same time, that plant is making eyes to send up shoots for next season's crop. We quit cutting between the 1st and 4th of July, always try to get cleaned up so we can shoot fire-crackers on the Fourth.

A member: What does the producer get for those 1,500 bunches to the acre?

MR. HULSART: Ask the hard questions of the other fellow, don't you put them at me. If we are getting $3.00 a dozen or $2.50, it would be easy figuring, but one day or two days we may be receiving $3.50 and the next week the weather changes, it comes hot enough to make you stroke your brow and down will come the price to $1.75 or $2.00. If you will tell me what the price is going to be until the 1st of July, I can answer the question fairly well. Unless you can tell me that, I cannot answer the question. We start somewhere around $3.25 to $3.75 and sometimes take as low as $1.50 and then comes a little cold spell like last week and up it will go to $2.50 or $2.75, sometimes $3.00. The average good acre of asparagus through our section runs somewhere around $200 an acre. I know some men who claim to get $250 an acre; I don't want to set anybody crazy thinking they are going to get rich growing asparagus because I happen to come here, and if they meet me somewhere else after they have made a failure of it, have them hit me back of the neck because they made a failure of it.

A Member: After you quit cutting and the top grows up probably 3 feet high, when do you cut that off?

MR. HULSART: I don't cut that off until about time spring is opening, and the frost is leaving the ground. In my section, we don't have much snow and sometimes when we do have snow, it is all over along the fence. I'd rather have it in the field and if we leave the tops on, it doesn't drift. About the time the frost is going, I have men go up and down the ground with a sharp hoe. It doesn't take very long. Remember, the asparagus plant grows seed on one plant and fertility on another plant. There's male and female plants in asparagus and the plant that does not produce seed is always the best crop producer. When the man comes forward that can pick out the male plants from the females and set our beds from that kind, we will be able to produce a greater yield of asparagus. If you are going to set them out and wait until they seed and go back and set them into permanent beds, you will lose more than you will gain. I know one man that claims he can tell a great many of them. How near he is doing it, I don't know. In his own field, he does it by the shape of the bed when they are one year old. How near a success he is making, I don't know. I don't claim to be able to tell them at all. If I could, I wouldn't set anything but the male plants, they are the best crop producers. Friends, I thank you for your attention. Mr. Martin, will you take that home with you?

A Member: Mr. Hulsart, what do you think about hibernating insects in the tops standing over?

MR. HULSART: The asparagus beetle hibernates under shelter of any kind. If they have asparagus beds in the open where there are no fence rows, wood or collection of trash, the bugs will go to a distance to hibernate. If you have got leaves the trash, etc., they will get under there. I have known instances where men put things around the asparagus field for them to go under and when they get them gathered together in their winter quarters, then they destroy them. The only way the farmer can get clear of the great crops of asparagus bugs, is to follow up the late brood and poison them, but men are so busy at that time of the year that it is practically impossible. They come in seasons. One crop of bugs will come and they will lay their eggs and finally will disappear. They hatch, grow to be adults, and they will be on hand for a week or ten days and then they will disappear. Towards fall another crop comes and they grow up and hibernate in the leaves and trash around the edge of the field, and if the tops are heavy enough to get under there, they will do it, but very few of them because the tops do not fall down until windy, cold weather or snow comes and the bugs are all in winter quarters before that time; but if the farmer could do thorough spraying in the latter part of the season, we would do away with a large part of the bugs.

AGRICULTURE AND THE PUBLIC SCHOOLS

PROF. L. H. DENNIS, *Expert Assistant in Agricultural Education, Department of Public Instruction, Harrisburg, Pa.*

Mr. Chairman, Ladies and Gentlemen: On a recent trip throughout the Middle Western states—I say recent, it was about a year and a half or two years ago—it was my pleasure to go through the Ford Automobile factory, located at Detroit. Visitors have access to nearly all parts of that great and wonderful factory. The most interesting thing that one notices is the system that prevades every shop. We were told, as we were taken through the various departments, that it is possible for the manager of that great factory to find out at any time of the day, the exact status of every department in the entire factory; the system is so complete. The thing that interested me the most, however, was the fact that they have in their various departments, specialists whose business it is to carry on a searching examination and investigation every hour of the day and every day of the week for the purpose of ascertaining if the best processes are in use there at the present time. They carry on this examination to see if it might be possible to substitute some other materials in place of the materials they are now using, and to see if it might not be possible to put the materials that are in use through some different process in order to arrive at the same result with less work, with increased efficiency, and, of course, with greater profit, which is the end.

On that same trip, it was also my privilege to go through, what is probably the most modern flour mill in the United States; if not in the world. It is not the largest flour mill in the United States, it is one of the largest, but not the largest, but it is the most modern. Again, the thing that interested me most there, outside of the direct management of the mill, was the fact that these people have found that it pays them in dollars and cents to hire a specialist whose business it is every working day of the week to examine into the processes used in that mill. He carries out physical and chemical tests daily of the flour that is turned out there, what they call blended flour. It doesn't have quite the same meaning as when we use that term. The man who holds that position was for years an agricultural chemist. This large milling concern has found that it pays them in dollars and cents as I stated a few minutes ago, to hire that man at a good-sized salary for the purpose of examining into the methods that they employ in that big mill, and the thought occurred to me as it has occurred to me many times since, that if these various lines of industry—and they are only small phases, you might say, of industry—could afford to hire specialists whose business it is to carry on a daily examination of that business, a daily critical self-examination, you might call it, because these men are employed by the business itself—if it pays them in dollars and cents to hire such men, it seems to me that the great business of farming can afford to carry on the same critical, self-examination.

In a group of people of this nature—it is not necessary for me to say anything about the importance of farming—we all know that every living person in this country depends upon the man who produces the food and the clothing for all of us—it is not necessary for me to emphasize that point whatever, but I do believe that it is worth while to say in passing, that this business is big enough, is fundamental enough, is of sufficient importance to all of the people of the United States as well as to the men themselves who are engaged in this business, to carry on a daily, critical self-examination of the business, and the only reason I make that comment is that here and there we still find someone who thinks they know all there is to be known about the business of farming just because we have had handed down to us customs and traditions from the past. I say the business of farming is big enough and complex enough to make it pay us in dollars and cents to carry on this same critical self-examination that has resulted in such great profit to the automobile industry. I could mention a hundred and one illustrations; I could point to the development of transportation which has been the result of critical, daily and hourly investigation into the methods that were in use for the purpose of finding better methods, finding better materials, for the purpose of bringing about increased efficiency, and the business of farming can stand, yea, it needs that same critical self-examination.

Now the agricultural leaders of half a century ago, yes of a hundred years ago, realized there was need of this critical examination. George Washington pointed out in his time that it was necessary for us to make a study of the soil. Benjamin Franklin pointed out the fact that you could produce more on an acre of ground that was properly cared for, fertilized, than you could on an acre that was not, so what we know about fertilizers is not altogether of recent origin. Thomas Jefferson pointed out the fact that many improvements could be made upon the plow. Some of his suggestions were taken up by practical men and put into operation, resulting in some definite improvements to the plow. The first agricultural society in this country was organized in Philadelphia in 1776, I think it was, and Benjamin Franklin and George Washington were both members of that agricultural society. Half a century ago, the agricultural leaders—and they were more numerous by that time, realized full well that there was a great need for more definite information about the scientific facts underlying the common farm practices with which everyone who lived on a farm in the open country was more or less familiar. What was the result? We had established land grant colleges whose purpose it was to get, to secure some agricultural facts. Later we had the experiment stations. Later on, we had our national department of agriculture and the various state departments of agriculture. The point I want to make is this, the great problem half a century ago, was the problem of securing reliable information of a scientific nature concerning the process of farming.

Now the great problem before the agricultural leaders of today is not one of securing this agricultural information, although there are still many, many things that we do not know about farming, much as we do know, much as we have inherited from the past, there are still many facts yet to be learned and you and I will be dead and gone before some of the very simple facts—they may prove to be—will be common knowledge among the people of this State. But even though there is much to be learned, the great problem of today is not one of securing this information. The problem that the agricultural leader of today faces is this, it is the problem of taking that information which is available to the people who are on the job, if you will excuse the slang, carrying it from the various sources to the people who are doing the work and further than that, putting that information into operation.

It is one thing to get this information; it is another thing to take this information to the people who want it, and another thing to get that information put into operation; and the great task facing us today is this task of carrying this information to the people who want it. That is why we have federal aid for this work; that is why our National Department of Agriculture is carrying on all these demonstrations throughout the United States. That is why the State Department of Agriculture with its very efficient corps of instructors, is busily engaged in this very proposition because that is the job of the agricultural leaders of today. And right here in passing, I want to pay a tribute to the man who stands at the head of our State Department of Agriculture for the past few years and who has been developing that department of agriculture into a very efficient department. I say, long may this Department live and may its efficiency be further increased, and I also want to pay a tribute to the men who are engaged in this very business which I think, and I am not alone in this, is the business of the agricultural leaders of today, that is the business of taking the information from the various sources—and there is no one source—from the various sources, to the people who live in the open country and are endeavoring to put this information into practical operation, and you men who are members of this Department of Agriculture, engaged in this work, ought to take renewed faith in this cause in which you are working.

In passing, I merely want to say that I believe you are all engaged in what is today the big agricultural problems. There are problems that are to be solved right on the farm, that is true, but it has been pointed out to us time and again, that there is already enough information which, if put into operation, would save us millions of dollars every day. Our state colleges, experiment stations, the National Department of Agriculture, all these agencies have now a vast amount of available information, but the problem is to get it to the people who want it, and after you get it there, to get it into practical operation.

We are hearing a good bit these days about the problems of the country, and some people would have us think that the country has gone to the dogs, that the country church is practically no good, that the country schools are of practically no value, that the country home is no good, that the woman on the farm is a beast of burden, and nothing more, because some people have been carried away in their enthusiasm to extremes. Dont forget for one minute—and I know you won't because you men know the situation because of your vast experience—don't forget for one moment that the city has more problems than the man on the farm has ever had, and I want to say right here that I believe those who have anything to do with the working out of the problems connected with life in the open country are coming a little bit nearer to a realization of those problems than the people in the cities who have been wrestling with the city problems for the last half a century. They will always have their problems in the city, but they are over-shadowed sometimes, by the newer problems that come up. The only reason we are hearing about the problems of the country today is because this is newer to some people; the problems are not new by any means, but they are new to some people and get more space in the newspapers, but the same problems, the same disagreeable problems, some of them are, in the city, are still before the people of the city and I am not going to point out what they are, but let me mention one or two.

The question of housing, the question of good streets, the question of a sufficient and pure supply of water, the question of sewage, the question of the prevention and control of fires—right along that line you may know that Ex-chief Croker of New York City, who for years was head of the fire-fighting system, discovered there that in spite of the fact that they were spending more and more money in the city of New York every year for improved fire apparatus for increased efficiency in their fire-fighting department, that in spite of that fact, they were fighting a losing fight in the City of New York, that fires were increasing, that property damage as a result of fire was greater every year until Chief Croker came to the conclusion that they were not attacking the problem in the right manner and resigned as chief of the Fire Department of New York City and went into the fire prevention work, attacking the same problem from a different view. There is a problem that the city will always have, and there are a good many others. And I want you to consider the vice prevalent in the city; and they have their problems while the people in the country are having theirs, but I do believe that those who have anything to do with helping to solve some of the problems that are peculiar to life in the open country, are coming just a little bit nearer a better solution than some of the people who are engaged in attempting to solve the problems of the city. Perhaps it is hardly necessary in an audience of this nature to call attention to that fact at all.

I must confine myself, owing to the fact that there are several speakers on the program, to the particular subject assigned to me, yet what I have said has a bearing on what I say. The great problem of today, let me repeat, is this problem of getting this information from the various sources into the hands of the people and may I say here, that the work is so great that there is work for all hands to do. No one man, no one agency, no one group of men, can do all of this work. The work is so great that there is work enough for all to do. My great hope is, and the thing that I endeavor to help as much as I can in my weak way is this; I believe when all the forces that are engaged in this proposition that we are discussing here to-night, or when all the forces now in existence or which may come into existence that are engaged in this proposition of carrying this message, this information from the various sources to the people, are working hand in hand and in close co-operation, the work is going to be done more efficiently than now, is going to be done more rapidly and with greater success ,not only as far as the work is concerned, but as far as the co-operating agencies are concerned. I believe, my friends, that that is one of the great problems facing Pennsylvania today and I trust we will be able to see our way clear for every force to increase its efficiency without losing its identity, and I think a close co-operation will help to bring that about.

Now where does the public school figure in this agricultural development? I want to say here, in passing, that I do not believe that it is the function of the public school to participate in industrial movements for the improvement of agricultural conditions unless it can do it very largely through the rising generation, because there is its business. The business of the public school is to give the boy and girl, that comes into that school, the type of training that that boy and that girl ought to have. It is a question as to whether we have been giving the most efficient form of education. I say it is a question. I hardly think it is a question at the present time. I think we have come to the conclusion that our present system of education must be modified, not eradicated, not thrown away, but modified to some extent so that with the training of the head, we may give some practical training of the hand. I believe that every boy has a right to expect, when he enters the doors of the school room, that when he comes out of that school room, at the end of a term of years, he shall be better able to earn his daily bread and butter as a result of the education that he receives there in that school. The education that he receives should be an education *for* work instead of an education *away* from work. I sincerely pity the boy that grows up without any opportunity to work, without any chance to work. It has always been my conviction that every boy, regardless of where his home is or what he expects to do in the future, would be much better off if he could spend one to three years on a farm. Every city boy would be better off from the standpoint of his physical condition, his mental condition, stamina, and growth of all kinds and his outlook on life, if he could take three years of his life and go right out in the country and live on a farm, not board on a farm, not be a guest, not be a student on that farm, but be one of the young men who live there and work there and play there. I believe that every boy would be better off. I have been thankful many and many a time that it was my privilege as a boy to live on a farm, and get that very experience which I would not exchange for many dollars, regardless of the work I am in. Every lawyer would be a better lawyer, I believe, and every doctor would be a better doctor, if, during his boyhood days, he could live through some such experience as that.

Now, coming down to the direct question of the discussion of agricultural schools, as I shall have to jump into that now rather rapidly—there are in the United States to-day, three types of secondary schools of agriculture. In discussing agricultural education now, I shall say nothing about the agricultural colleges or higher agricultural education. There are three types of agricultural schools in this country, all doing about the same kind of work, dealing with the same type of boy.

In the first place, there is the congressional district agricultural school which, as its name signifies, is a congressional district school, that is to say, there is one school of this kind or type to each congressional district in the State. The schools of Georgia are examples of this type of education. It has been my pleasure to visit every one of this type in the United States, having visited every state east of the Mississippi, except three or four, for the purpose of visiting these schools and trying to get some measure of their efficiency. The congressional district school must, of necessity, inasmuch as it is intended to serve the entire congressional district, must have a rather large equipment, it must have dormitories to take care of the boys and girls who come from considerable distances. I have found in all the congressional district schools I have visited, that a large percentage of the boys and girls enrolled in that school come from the county in which the school is located; most of them even come from that section of the county in which the school is located. I found one school down in the State of Georgia that was located way up in a corner of the congressional district and about 65% of the students came from that county, most of them coming from the upper half of that county. There were one or two counties that had few or no representatives in that school at all. The school attempted to serve the whole congressional district. The school had a school farm and rather a large school plant.

The next type is the county agricultural school which is very similar to the congressional district school, in fact, I have found in some states, county agricultural schools that had a larger plant than some of the congressional district schools. They did not serve as large an area or as many students, in some cases, but had more money behind them to produce the schools. These county schools attempt to serve the whole county, but even in these county schools, it is necessary for boys and girls to come to school and board or board in town. That is true in Wisconsin where they have a number of these schools and it is true in Maryland where they have a few. It is necessary in such cases to have a school farm.

The third type is the agricultural department in an existing high school. It is the smallest type of the three; it is the type which is the nearest to the people of the three; it has the smallest equipment and takes the least amount of money to start it; but by the way, you cannot measure the efficiency of a school by the amount of money you put into it at all, though it is sometimes true, that if you put little or no money into a thing, you get few or no returns. You cannot expect in education, or anything else, to get something for nothing.

The advantage of this agricultural department in an existing high school, the advantages, I should say, are chiefly these: In the first place, the school is right at home; the boy and the girl can come into school every morning and go back home every night, and it is my firm conviction that boys and girls of a high school age, should be at home every night during the high school period. They are needed at home, the mothers are in need of the girls of that age, and the fathers, the farmers, need the boys of that age, because they are a very great help mornings and nights, Saturdays and holidays, during the summer. And, furthermore, they need their homes very much at that period of life.

Now the agricultural department or agricultural high school, if you wish to call it so—this school is located so near the homes of these boys that it is not necessary to purchase and operate any school farm.

The main objection to having a school farm is this: That that school farm is very apt to be run under conditions that are not natural; they have to do certain things in order to fit the school conditions and the experience that the boy gets on a school farm does not always compare favorably with the experience that he would get on his own home farm, and the home project work which every boy carries on who is a member of the agricultural class in these agricultural high schools, the home project which he carries on can be carried on on his own home farm under the supervision of his father as well as of the teacher of agriculture of that school, and the school is so located, inasmuch as it serves a rather limited area, that the teacher of agriculture can get to the boy's home and supervise that project. I will tell you more about that later, when I throw these slides on the screen.

I think those advantages are advantages that are worth considering. I admit that this type of school is under a very close scrutiny and must stand a more severe test than your larger county school or your congressional district school. If you want to get a lot of advertising, create your special school serving a county or several counties, build several attractive buildings, buy a school farm, put up large buildings with dormitories and then take your pictures, as some of our Western states have done—the Western states know how to advertise and find that it pays to advertise in more lines than just in business—some of those states have credit for operating types of education that have been in operation in Pennsylvania and New York for the same period of time that they have been in operation in those Western states, yet the people of Pennsylvania and New York know nothing about it because we have not learned how to advertise. I believe that a certain amount of advertising in school work and church work and other lines is legitimate and even necessary. We can learn a great many lessons from California and other states that can produce apples, not as good as the apples grown in Pennsylvania, yet by their methods of growing and marketing and advertising, can send their product clear over to Philadelphia and New York and educate the public to want their apples in preference to those grown in Pennsylvania and New York. It has been my experience to find that the dealers in fruit there, particularly the retail dealers, will try to impress on you the fact that they are selling Western apples, not New York State apples, and not Pennsylvania State apples. They must have learned that the public is looking for Western apples, and it is because of the way those people advertise.

I believe it is about time that we Pennsylvanians took hold and boosted Pennsylvania. About the only thing we have been hearing about Pennsylvania is the graft of the State Capitol, and I am sick and tired of it. I have heard time and time again when visitors would come into that Capitol, the very first thing they would say to the guides who so efficiently serve them, "This is the building on which there was so much graft." They never see the beauty of the building at all. I say it is about time we took some pride in that magnificient Capitol, the best in the United States. I say it is about time we begin to boost Pennsylvania, in other ways, that we be boosters, not knockers in Pennsylvania, and I believe it is a part of my business because of the work I am in, and your business because of the work you are in, to help on this movement of boosting Pennsylvania. It will take a period of years to get the people of the State generally to boosting everything in the State. You may think it is an easy matter, but isn't it time we quit knocking each other? Isn't it time we started in to boost each other? It is not characteristic of Pennsylvania as of those Western states, particularly the Pacific Coast states, for everybody to take hold and boost everything in the state. You talk to anybody that lives in California, and in five minutes you will be convinced that the thing you ought to do is sell out and go to California. We have a good bit more reason for talking that way about Pennsylvania than they have about California, because if the truth were known about all sections of California, you might not want to go out there and live. There are some nice spots in California, but the state, as a whole, does not compare to Pennsylvania, and it is about time we did something. Pennsylvania has decided, as have New York and Massachusetts, Indiana and the State of Michigan, and the great State of Minnesota, which has thousands of dollars to put into education of this kind, that the most efficient form of secondary agricultural education is agricultural education of the high school type, that type which is typified by the high school department of agriculture or the agricultural high school in the agricultural community. It makes less of a showing, it takes longer to prove itself, but it is nearer to the people and it must stand the test.

One illustration: A boy carries on a home process, he carries on that on his own home farm. His father sees every day what that boy does, sees the methods that boy employs, learns what the supervisor of agriculture tells that boy when he comes to talk with him about that project. If there is any value in that project whatever from an educational or productive agricultural standpoint, that boy's father gets it also. If there is no value in it, that boy's father soon sees it and the whole business no longer receives that man's support. If that boy went to a county or congressional district agricultural school, he could carry on his work on that school farm and nobody would know what it was. It isn't under such close scrutiny, it doesn't have to stand the test. But let me re-iterate that the chief function of the public school, or agricultural high school in this development, is to give the boy or girl that comes into that school, the type of education, that he or she ought to have in the improvement of agricultural conditions. Some of it will come as a result of the instructions given in this school, but primarily, it is to give the boy or girl the type of education he should have, and I think that school should give him some information about the business he is engaged in and which he probably will follow when he gets through with this school work.

This agricultural school work started in Pennsylvania two years ago with the passage of the Vocational Education Act. Five schools were started; this year we have twelve schools in operation in twelve different counties, and next year there will be many more in other counties. As I said a little bit ago, I believe it is time we all pitched in and co-operated with each other. My theory is this: That these agricultural high schools ought to be local centres for the various agencies that are carrying on their very efficient work, and I want to say right here, that all of these agricultural high schools stand ready to assist and co-operate in any and all of these movements for the improvement of agricultural conditions in the State of Pennsylvania. The agricultural high school movement is only one, is a small phase, not to minimize the work they are doing, at all, but it is only one phase of this great movement for better agricultural conditions in the State. It has its peculiar work to do, but we do believe while it is doing this work, it can work hand in hand with those who have some other phases of the work to do.

Now, without further comment, I want to throw on the screen a few slides showing some typical scenes in a few of our agricultural schools. You will notice as these pictures are thrown upon the screen, that the scenes, as they are presented, do not represent the ordinary school room. The atmosphere of the ordinary school room is not present in our agricultural school. The work is practical. Allow me to say here also, however, that in our enthusiasm, we do not allow ourselves to forget, as I stated twice this evening, that the chief business of this school is to give an education to the boy and the girl that comes to this school. Training for citizenship is not lost sight of, and half of the boy's time is spent in the study of practical subjects. The other half is spent in the study of academic subjects because the boy on the farm will always have as much need of English, and the same English training, by the way, as the boy who enters the factory or the shop or the bank or the store. This particular school happens to be located in a court house, there being no available space in the school house. But this is a high school located in one of the northern tier of counties of the State. There happened to be no room in this building for the agricultural department. The next building with the white columns, had a very large basement which was utilized for this purpose, a series of rooms being fitted up for the agricultural department. This, it happens, was not the slide supposed to be in that particular place. It happens to be a picture of the prize winners in the bread and cake contest in one of the high schools in the northern part of the State. It goes without saying that the study of soils is an important part of the work in these agricultural schools. The work of these schools consists partly of recitation work in the agricultural class room, or the laboratory, as it is called, consists of experiments in the laboratory and consists of field trips. The previous pictures showed a class in agriculture under the direction of the supervisor of agriculture, sampling soils in the various fields surrounding the school. As a rule, most of the boys in these agricultural schools, ask the supervisor of agriculture to come to their home farms for the purpose of examining the soils on their farms. In many cases, soil maps of the farms are made.

This is a class in a small, but very up-to-date and progressive agricultural high school or agricultural department in a high school in Lancaster county. Even Lancaster county, with all its knowledge of agricultural conditions, with all its agricultural wealth, has found that it pays to take up this form of education. Here is a picture of that same school in Lancaster county. Two boys have been carrying on some experiments with soils and are making their weight measurements. Poultry raising is usually taught in the first year of the course, although a fixed course, or suggestive course has been offered for the agricultural schools of the State, yet the agricultural course is flexible enough to meet conditions in all sections of the State. Here is a class in one of the southwestern counties of the State, engaged in killing and dressing chickens for the market. That particular type of work is usually preceded by a study of it and the study of the various methods of killing and preparing chickens for the market. That is followed by a demonstration on the part of the teachers and the students themselves.

Here they are using the French killing knife and dry-picking the chickens. This is a poultry exhibit at Waterford, in Erie county. It was a small high school and a small department when it started out, but proved to be one of the most successful in the State. The boys made all the coops in which the fowls were exhibited with the exception of one. This is a study of corn, another crop which is very important. The boys are taught how to select a good ear of corn. They are also taught the various ways of carrying on the germination test. This represents a teacher of agriculture with his two boys, looking over the results of a germination test, and there they have used what is known as the rag-doll tester. You are all familiar with that. I shall not go into details at all. The slides show those of you who are engaged in the agricultural work of the State merely some idea of the methods employed in these schools for carrying on this work. This is a corn and potato exhibit. These were the prize winners in Jefferson county last fall. Each one of these boys won a free trip for their work in raising these potatoes and corn. This class is out hunting for borers. As I told you a few minutes ago, the work is partly done in the class room and some of it is done in the agricultural laboratory and much of it is done out in the field. The work is usually so arranged that the class spends half a day under the supervision of the agricultural instructor so that it is necessary in the best interests of this work for that class to go right out into the wood-lot for the purpose of studying forestry. The class can do so and it is not necessary for them to get back in thirty minutes or thirty-five minutes for an algebra or Latin lesson. Their academic work comes in the morning.

Every boy ought to be taught how to take care of tools and how to handle tools. This is taken care of in our agricultural schools. This is a view in one of the schools started the first year in what was a worn-out, run-down, private academy, taken over as a vocational agricultural high school and started this year with an enrollment of between 60 and 70 students the first year. This very efficient and practical shop was made out of the basement by putting in more windows and concreting the floor. These are some of the things the boys make in the shop. I believe in manual training, the manual training that has been in operation in some of our schools during the past ten years has not fulfilled expectations. That is partly because of the type of work done there. It is true the boys are taught how to handle tools and how to take care of the tools, but some of the things which they make, and some of the things they do in order to learn, those processes are not in themselves practical. It is my theory that a boy can make something practical while he is learning to handle a saw or hammer or chisel. This work beneath there, that step-ladder, wheel-barrow and those crates, were made by boys the first year in the agricultural department.

This shows boys in one of our agricultural schools making a blue-print frame. They wanted to make a hot-bed, and they first drew their plans, then made a blue-print frame, then their blue-prints, then they started in the shop and prepared their lumber. They even made the sash, something which is not usually done, and glazed it. Of course, probably from a commercial standpoint, it does not pay to teach boys to make sash in the shop because carpenters as a rule, do not make their own sash; however, every boy ought to know how to do glazing. These boys later built the hot-bed. Most of those boys are Freshmen in that agricultural school. These boys are here learning something about shop work, about the handling of tools and are also engaged in the work of the poultry class. They are building this brooder house, partly on the time of the shop work, and partly during the time of the poultry class. Of course, all this work is preceded by the study of proper methods of housing the chickens.

That is a familiar sight to all of you. Of course, the use of the Babcock Milk Test—that is only one phase of the work in dairying done in these schools. I want to impress on you that it does not require any elaborate equipment to do this work successfully, because much of it must be done out of doors and right on the farm. However, I do not believe that any efficient system of education can be carried on by starting out every day to go and see what you can find, going out and hunting some cattle, and after you get there, judging the cattle. It must be preceded by some effort to organize your information and instruction.

This speaks for itself—it is a Wayne county scene, Bryson Springs, which must be preceded by some theoretical work. I am making no effort whatever to describe what is on the slides, because you can see at a glance. As I stated some time during the course of my talk, each boy who takes this agricultural course, which is a four years' course in the high school, must carry on some agricultural project. I shall show you here, slides illustrating two projects. Mr. Rockwell, the supervisor of agriculture in the agricultural department of the Mansfield High School,—one of our most progressive and successful agricultural departments in the state,—will probably tell you about several as he has several different types of agricultural projects in operation in his agricultural department at the present time. This boy is preparing the ground for an acre of corn. He has taken as his agricultural project the raising of an acre of corn. What particular project the boy takes, depends upon his home conditions and it is an individual matter in every case. This boy decided that he would raise 1,500 tomato plants and he did that. He raised them and canned and marketed them. He bought himself two canning outfits before the season was over and he canned beans as well as the tomatoes. On the 15th of last June—and the reason I have the date is that every boy who carries on an agricultural project must keep a daily record of what he does in connection with that project, in order to have some record of the methods employed, and expense and labor and everything, everyone must keep this daily record—this boy kept his daily record and that is the reason I happen to know that it was on the 15th of June of last year when we had a frost and he covered 500 of his 1,500 tomato plants and the others he went out early in the morning and wet them in order to save them. He put his tomatoes on the market and the brand was known as the Waterford brand.

Now while we are providing practical education for the boys, we are also giving some attention to practical education for the girls, and there is a side of our education which we have not as yet developed very much. I am not going into that phase of it. That subject has probably been discussed by those of your own staff who are giving this matter serious and constant attention. While we know something about a balanced ration for a chicken and a hog and a steer and a cow, as yet we know very little about a balanced ration for a man or a woman or a boy or a girl, and it is infinitely more important that we know something about a balanced ration for ourselves than for the hog or the hen, and I believe that our education will be so modified that every girl will receive some instruction along this line. A reasonable amount of dressmaking, plain sewing first, some little fancy sewing in case some individual may desire it, but the real, every-day, practical sewing. Some mothers can and have, many mothers can and have taught their girls practical sewing, but there are still other things those same girls might learn under the direction of a capable seamstress. These are some things made by some Freshmen girls in the home-making department in one of our agricultural high schools. I believe that in the making of those things and in paying attention to the cost of the materials used, the girl has received as much culture as in a lesson in algebra and as much mental training. Basketry is taught in some of our agricultural high schools.

There are many things that can be introduced in these schools. Now if the process of carrying bricks from the ground up a ladder on to the scaffold of a building in the process of erection, after being scrutinized carefully, could be so revised that man's efficiency could be increased from 25% to 50%, it is barely probable that the simple processes of laundering, washing and ironing, might perhaps, with profit, stand some inspection. It is barely possible that some of the methods that our girls are familiar with, might be modified to some extent after study. In any case, here is one thing we accomplish with all this work, regardless of whether any methods are changed or not, and some will be probably; here is a thing that is done and it is a thing that is necessary. Home-making is made popular with the girls, and do you know, my friends, I think it is about time that an effort is being made to make it more popular? It is all right for girls to study algebra, geometry, Latin, Greek and all those subjects, but if it is going to lead those girls away from home rather than toward the home, it seems to me that it is about time we give them some of this training with that other training.

Now I want to draw one distinction, that is this, and the reason I am going into details with you, ladies and gentlemen, is this: I feel that in the work you are in, you have a right to know exactly the methods we are following in the establishment and maintenance of these schools. Some of you have co-operated in the work of these schools already; meetings have been held in these schools; I want to draw this distinction for your information; sometimes a department of agriculture or of home-making, either or both, is established in connection with an existing high school, the school continuing as a high school with those vocational departments. Sometimes a special vocational school is started, which merely means that there must be in that school these two vocational courses. You may have a high school that has one vocational course, the agricultural, or one, the home-making. If you start a school that has both, you have what is known as a vocational school, what could be called, in truth, a vocational agricultural school; and I believe that is the type of school that is coming into the open country, because in that school, the subjects are properly balanced with relation to each other, the academic studies receiving the proper amount of attention and not too much.

This is a picture of an old academy that was on its last legs, just about dead, taken over as a vocational school and started this year for the first time as a vocational school with an enrollment of between 60 and 70 pupils. In that school were placed a faculty of 5 teachers, principal, academic teacher, and one teacher who devotes part of her time to the teaching of English and part to the teaching of drawing and music. The salary list of this school which is right in the country, a mile and a half from any railroad, runs about $3,600 of which the state pays $2,400. I claim that the country is just as much entitled to the services of qualified teachers, and experienced teachers, as the towns and cities are. And I claim that it is about time that the state put as much money into instruction in the rural districts as it does into the districts in the cities, and I also feel that not only the question of efficient teachers, but I believe it is about time that we let the cities and towns experiment with new teachers and we took the experienced teachers in the country. I think we are entitled to that. Three of these five teachers are college graduates, and the other two are graduates of normal schools. There is no reason why we should not have a school of this kind in every section of the State. That school is operated by four districts that went together for that purpose and I believe in many cases the township is not the ideal unit to operate a school of that type. Three or four districts in the country should go together to operate a consolidated vocational or high school. Furthermore, there should be some special inducement on the part of the State for the formation and maintenance of such a school.

This was the agricultural laboratory in that school. Here are the girls in the Freshman class. Notice the fact that the girls of this school are more mature than the Freshmen of the average city schools. It means that better work is being done and more sensible work, you might say. One thing that the boys in the country—one opportunity that comes to them with the creation of a school of this type, among many others, is the opportunity for a chance to play with each other. These schools usually have their athletic teams of various types. This school had a basket-ball team, a baseball team, and a football team. I think it is a thing that ought not to be overlooked. I haven't time to go into that phase of it now. One other side to the work of this school—I believe the school, while its chief function is the serving of the boys and girls who come there, ought to have one other, which ought to be of some service to the entire community, it ought to have on file all the bulletins of the State Department of Agriculture, the United States Department of Agriculture, and our agricultural colleges and experiment stations, so that if any farmer wants to come and secure the use of these for one day or three days, he has a place to go and get them without any trouble or expense.

Night schools can be operated for all classes of people in the district. You notice the little girl in the front seat—she is there because her mother who sits immediately behind her had no one with whom to leave her and had to bring her with her. When she entered this school, she didn't have the ability to make a dress for the little girl. When she finished the course that winter in this evening school, she had made several dresses for the girl. Of course, that condition of a mother not knowing how to do plain sewing for a child, is not typical of the country districts. This is a picture of a farmers' night school. This is one other way in which these agricultural schools serve the people of the community. The farmers of the community are invited to come in once a week, if they care to, for the purpose of conducting what is sometimes called a farmers' night school. This farmers' night school is presided over a part of the time by the supervisor of agriculture, who takes up the topics the farmers themselves desire. On various occasions, various other agricultural leaders, members of the state department of agriculture in the vicinity, come in and conduct the work for an evening, members of the state college staff who happen to be in the vicinity, and prominent farmers take charge, some evenings, men of exceptional ability; in one or two instances, I have known the veterinarians of the district to come in and give instruction at these sessions.

Now what are we going to accomplish as far as the promoting or improvement of agricultural conditions is concerned? Is it going to be possible for us to grow sweet potatoes like that as a result of agricultural education in our public schools? Notice the size of those sweet potatoes. I have been growing sweet potatoes on a small scale for the last two years, but I don't guarantee that those particular sweet potatoes were grown in my garden, nor that those strawberries came from my garden. We are going to do some big things according to some city enthusiast. Everybody takes hold of this great agricultural up-lift, as some of these city people like to call it. I suppose some of those persons think we really will be able to raise strawberries something like that and maybe cabbages of that size, but I will tell you what we will do through the work of these agricultural high schools, we will give boys of this type and this age, the kind of education they ought to have, and the kind of education, my friends, that they are entitled to, and that I believe it is our business to give them. Mr. Rockwell, who is to follow me, will give some details of the work of his own school. I have not gone into detail very much in connection with some of these things because of the fact that he will follow me. I thank you very much for your attention.

ADDRESS OF PROF. ROCKWELL

Mr. Chairman, and Members of the Normal Institute: Will you pardon me at the outset if I should happen to use the pronoun "I" a few times in order to explain my position here? This morning when I first consented to be sandwiched in here this evening, I understood I was to talk to an audience of teachers; but I see in the foreground a body of note-worthy men—ladies and gentlemen—the greater part of whom are experienced lecturers and speakers, and it certainly is an embarrassing position for a man who never before has had any experience in public speaking. A little fellow came on the stage and with a trembling voice he uttered a little piece which was so appropriate to the occasion that I never can forget it. He said:

"Speaking pieces, speaking pieces,
What's the use, I'd like to know;
Getting up before so many,
When it scares a fellow so?"

This is my first appearance as a public speaker. I hope I do not make as big a blunder as when I first appeared before the Board of Examiners of the Normal School. Mr. Casey was conducting the examination in reading and asked for some definitions, and finally asked for someone to recite some poetry and make some proper gestures. The only possible thing I could think of, was "The Village Blacksmith." I rose and started and began like this:

"Under a spreading chestnut tree,
The village smithy stands;
The smith a mighty man is he
With large and sinewy hands."

Then unconsciously I said this:

"And the bristles on his brawny arms,
Strong as iron bands."

Knowing perhaps, Casey's humorous side of life, and how he enjoyed a joke on the other fellow, you can judge whether I passed in reading or not.

I will have to tell a story on a gentleman from his locality. He purchased a new span of mules and put them to drawing potatoes. He had loaded up a wagon and had to draw them up a hill to get them to the house, and he started along and was becoming so infatuated admiring his new span, that he had not noticed that the end board had fallen out and the potatoes had all rattled out. He got half way up the hill and his long-eared friends refused to go any further. He looked around and saw that the potatoes were all gone and a very disgusted expression came over his countenance as he uttered the words, "By Golly, stuck and nothing to unload." I can assure you that that is exactly the position of the speaker at this time. The good member of the Board who asked me to talk this evening, told me he didn't want me to say very much and I am sure he could not have picked a man who was more sure to fulfill those qualifications than the one he has at the present time.

It is my purpose to discuss with you for a very few minutes, the public school system in respect to its origin and purpose, its good qualities and its short-comings, some partial remedies and what we are doing and have done at Mansfield along the line of practical education. As probably the greater percentage of you know, the public school is not American in its origin, but has come to us from across the water and is principally of Dutch descent. It is about 155 years old. It was grafted on our national life at a time when ideas and conditions were vastly different than to-day. It was promoted with the purpose of universalizing education. The books were few and the colleges were few and were for the few. The college authorities saw this and conceived the idea that if they could import a sort of a free public method of education which would be classical in its tendencies, it would prepare students straight for college and increase the number of their students; so you see the public school system was promulgated with the end to treat every one alike, to achieve this particular purpose and prepare people for the colleges.

I heard Dr. Windship, of Boston, speak on the subject of public schools, etc., and he said that it was a rare occasion when we allowed our cattle to go for many months without giving them some change of feed and yet, he said, we have not changed the feed of our public schools in the last 25 years. This is somewhat far-fetched in its meaning, but, nevertheless, it opens an avenue of thought well worthy of our consideration. In discussing the proposal to build a new $50,000,000 Union Railroad Station in Chicago, a certain editor came out in his paper and said he thought it would be very nice if we knew where our grandchildren wanted that station located. The second editor said that he thought we ought to go very slow with the public school and not have anything in it that our grandfathers would not sanction. I am convinced that we cannot build railroad stations for our grandchildren and schools for our grandfathers.

The State Department, as you have heard to-night, is advancing some new ideas along the line of education, and in every case are willing to back those up, yet there are lots of people who are not willing to accept those ideas just because their grandfathers and grandmothers all the way back to the ape, have always lived under those ideas and always will. Such people are dead from the chin up and oppose all new ideas, and when one comes out in a newspaper, they want it stopped right away, and in nine cases out of ten, they owe for their subscriptions. When such a person dies, the editor has to print it under the head of "News," and is always glad that such a person has finally consented to be buried. This may be an old story to many of you, but it impresses very forcibly the large number of students who drift away from these schools at the age of 14 and 15. The last statistics I found, showed that out of every 100 people starting into the elementary schools, seven get to the high school, and out of every 100 getting to the high school, five get to college.

You will ask what becomes of that vast army that never get to college. They drop out into the so-called dark alleys of the world, become boot-blacks, newsboys, messenger boys, etc. This proves to me very decidedly that our public school system, that our system—of course, our system to-day is an improvement upon the system of the past, but it has not gotten away from it so far yet; it is educating about 10%; the other 90% are going away from school at the age of 15. I think I see a partial remedy to keep some of those people in school and that remedy is this, to give them a little molasses and not feed them sour kraut all the time. What I mean by molasses is inculcate something in the school system which will give the boy and girl an inkling of something they can do or some vocation they can take up in after life. Did you ever stop to ask a boy what he goes to school for? Have any of you ever tried out that proposition, especially with a boy that is 12 or 15 years old? Sometime, if you are ever in a school, you try out that proposition and it will amuse you greatly what the boy goes to school for. He has the idea that he has got to go to school until he is 16, then he is going out to get a job. I have tried out the proposition many times and it is the compulsory side they look at entirely.

The average boy going to school is like Pat and the rabbits. Pat came to this country all filled with curiosity and went down to a railroad station one day and saw a box with a wild rabbit that someone was shipping to a friend. His curiosity got the best of him. He went over to the box, looked at the address, lifted up the cover, reached down in the box, began to fumble around carefully, and all of a sudden out went the rabbit, over the railroad track and Pat after it. When he got on the hill, he saw the rabbit wriggling his tail at him in defiance, and he said, "You rascal, keep on, you don't know where you are going, the address is back there on the box." (Laughter.) The average boy going to school is like the rabbit, he don't know where he is going simply because there is nothing addressed to the life of that boy to make him look forward to some job or some vocation in life. I am talking about the boy, but I see ladies in the audience, and I don't want them to feel slighted. President Taft said that he thought if we taught the girl some trade, that the matrimonial proposition would be practically solved, and to sum it up in brief, he said, "When some weasel-eyed, skin-flint of a good-for-nothing came along and wanted to marry that girl, and she could earn her own living, she wouldn't have to put up with anything like that simply because she is afraid to be an old maid."

To turn to the other side of it, I have in mind two persons, we will call them John and Mary. John earned $18 a week and Mary was the daughter of a good family. Her father was a man who earned a moderate salary, but had provided a good living for her, and in the meantime, Mary had become very extravagant in her ways; and, to make a long story short, John and Mary were married. When John went home to the first meal, Mary had made some biscuit. He sampled the biscuit, concluded he didn't like those biscuit very well, and about that time the cat came along, one of the biscuit fell off the table, hit the cat and that was the end of poor kitty. Next time he came home, he tried to choke down the beefsteak, and had to go to the saloon for something to eat. Things went from bad to worse and sooner or later, the matrimonial bark was wrecked on the rock of Mary's inefficiency. Mary was a high school graduate. She studied her Latin, her Cicero, geometry, algebra, had the whole outfit, but when John came home, he couldn't drink coffee made from the extract of 50 quadratics, we will say. He couldn't eat bread baked in the devil's coffin, he couldn't eat hash made of permutations and commutations of quadratics; he had to have something wholesome to eat. So you see Mary's education did not function when it came to keeping John's house. She had failed in the divine duty that she was supposed to do in life, making a good home. I think the nation depends upon the efficiency of the home to a certain extent. The mother, I am sure, is the largest factor in the American home. She is 90% of the American home. Doesn't it stand to reason that if Mary had not had quite so much geometry and algebra and Cicero and Virgil and all that stuff, and if in addition to that she had had something practical, don't you think it would have been better for Mary? Don't you think it would have been better for John? I think you see the point I want to make.

To illustrate another point, which is my last one, I wish to tell you a story of two sisters I have in mind that were left a farm. These two sisters were both college graduates, one of them was teaching for $1,800 and the other for $2,000 a year. They thought they would run that farm for a while and they went home; they engaged a neighbor to manage the farm by the name of Joseph. My, wasn't Joseph proud to be manager! He worked from morning until night, Sundays, holidays, most all the time, he was so proud to be manager of that farm. The girls after a while thought they would go out and visit the other farms and get some new ideas. They went out and saw that the other people were conducting the Babcock Milk Test. They went home and told Joseph. He did not want to do it but was finally compelled to do it. Later they saw the other people around the country were washing their hands before they milked and they told Joseph they wanted him to wash his hands before milking, and he said that he washed them once a day and that was enough; and sooner or later on account of Joseph's unprogressiveness, he was released from the position. In the meantime, he had married the kitchen girl, and the girls had built the two a nice little cottage and they were indeed very happy. That made it necessary to get another girl from the woods. She came from the back-woods, had never even seen a train of cars. Her language was very poor, her walk was bad, her dress was a fright. She came there. Her stature was somewhat larger than that of the previous girl and she noticed that the girls talked differently from what she did and she began to eliminate from her vocabulary the things they didn't use. She soon surprised the girls by talking so well, after she had saved up enough money she went to the two sisters one day and asked if she could not go to the same dressmaker and milliner they did. They said "yes," so she went down and got a new tailor-made dress and the girls didn't know her at all. She looked so much better than they did that they were ashamed to walk with her on the street, and as Billy Sunday would say, as far as looks were concerned, "She had them trimmed to a frazzle." One day a real estate agent came out and Mary asked the girls if she couldn't go along. They said, "Yes," and she dressed up and got into the front seat, didn't make any bones of it at all, went out to the station where they were to look over the property and Mary became very much infatuated with it when she found it could be bought on the instalment plan and bought some of the real estate. To keep up with the hired girl, the sisters had to buy some, and next day the real estate agent came along and gave Mary a commission for what they had bought. Next day she started out and told them the possibilities there were in buying real estate on the instalment plan and it was not long before she told the girls she couldn't work for them but half a day, she had so much other work in selling real estate. About a month later she came around and told the girls that she couldn't work for them any longer because she had bought an auto, rented an office, and was a real estate agent. In three years Joseph was looking for a job. In three years Mary was a successful real estate agent.

I have a purpose in mind in telling you that story. The high school, or public school, if it is going to educate 90% of the people, or if it is going to give 90% of the people all of the education they will ever get, has some responsibility on its hands. You people are from all parts of Pennsylvania and are a very good representation from the State. No doubt, you are very influential in the places from which you come. Now are you going to be like Mary or are you going to be like Joseph in promoting this new idea, or promoting a school system which, if the boy cannot go to college when he gets through he will have something practical in life to work with? I will leave that for your own judgment. Mr. Dennis has shown you a number of slides. Some of the slides I expected to show you did not arrive so I only have a very few and it won't take me but an instant to show you these. This is a picture of the agricultural class of the Mansfield-Richmond High School. You notice there we have a very good representation. I will tell you how I managed to get such a large class the first year. When I went home from State College last Easter vacation, I went to the high school and gave them a talk on the benefits of a practical education. During the summer-time, I hired an automobile; I visited the whole territory in Richmond and Mansfield borough for students to take up agricultural work and I saw a number of students and talked the proposition over with them, especially the boys who I thought, would not be able to go on to college. The first day of school when the professor called for students who would like to take up the agricultural work, over half the boys in the school stood up and the professor was so surprised, that I could see he did not like it very well.

He is a gentlemen who has never thought very much along vocational lines. It was such a surprise to him; I guess he thought the whole school was going to turn into the agricultural department, so he eliminated a number of those boys who stood up, who, he thought, were too young to take up the work.

I just want to mention in passing, this, that we had a track at Mansfield last Saturday at which Tioga and several other counties were represented, and the Mansfield High School won the events, took 42 points; their nearest competitors about 25. Of those 42 points, about one-half of them were taken by the boys who came in from the farms. This gentleman right here, won the silver medal for getting the most points of anyone in the five schools. He also won a gold medal for scoring the largest number of points of anyone in the high school. This gentleman right here, won the shot, putting it 38 feet and 10 inches. This gentleman here functioned in the broad jump. Another boy got second in the broad jump. Of the basket-ball team, six fellows of the seven belong to the agricultural department; of the baseball team, six of the nine. So it brings to the front, the country boys who are the strongest of all, and are developed along other lines as well as agriculture.

This is a picture of the shops. These boys here are making step-ladders. These hammers were donated by Maydo. He gave them two dozen. We received a dozen saws, some squares, bevel squares and a number of things like that were donations. Here are some of the things that were made in the shop. This was taken early in the year before we had very many made. We have step-ladders, saw-horses, nail boxes, crates, etc. These are taken around town and many are sold. In that way our shop is a sort of self-sustaining institution and we sell these things for just what they cost. This is what I call my over-flow work. There's always boys who get through in the shops before the others do so I bought some lumber myself and had the boys make a little colony house and we made it according to scientific principles and when they would get through their work, I'd let them work on this colony house. This is to take right down and take out-doors. Here is the forge-room. I have in this forge-room, about $125 worth of equipment. It cost the school board about $18 or $20. The Bell people donated one of these forges and the Lancaster Forge Company, the other. The other equipment, anvils, drill press, taps and dies, and many other things—I bid those in from a sale in which the fellow had deserted his family and owed a rent bill and I got about $80 worth of stuff for $15, so you see we got the things for our forge-room at a very reasonable price. The things we make in here are rings, braces, chisels, hammers, horse-shoes, chains, etc., and in that way they get the welding and tempering and when they want something on the farm, they won't have to go to town and spend half a day to get it fixed.

In this project, they are preparing poultry for show, these are the different wash waters and here they are dry-picking a bird. This gentleman here lives at Hornell. He cannot be at Mansfield during the summer to carry on this project, but he is going to go on a big poultry farm there this summer with his uncle, so in order to say he had done some sort of project, I had let him hatch about 500 eggs and he has four machines to attend and he had good success with all but one machine which was a very old one and he is now running another machine in place of that. This is a demonstration of a capon fowls. This year I expect to have the different boys raise on their own farm about 200. This gentleman right here has already 26 capon fowls that weigh about 2½ pounds and he also has another bunch coming on that will be ready to caponize in the course of two weeks. I hope to have 200 marketed at Christmas time. I will market them for the boys, but they will raise them on their own farm.

Before I take up this picture, I will say a world about our work in poultry. About 12 or 14 of the boys are going to have projects in raising poultry. Two of the incubators were donated, one by M. M. Johnson and the other by the Buckeye Company. The boys will raise the chickens there on the farm. If they raise layers like the Leghorns, their problem will be, how much did it cost to raise Leghorns until they come to laying? If it is a meat breed, they will figure how much they make until they market their poultry.

This is a demonstration in pruning. I have three boys doing projects in orchard work. One boy has 57 trees, the other, in the neighborhood of 30. Their project will be to keep track of all the time and all the cost to take care of this orchard. They will make a map of the orchard, the kind of apples that grow on every tree, the number of marketable apples they get off each tree, then we will try to get a market for those apples. That is a project that will take some time during the summer. I have pictures of three boys doing work on the farm. This is another picture showing a demonstration in spraying. This is a picture of the night class. There are always some skeptics in communities when some new things come up. In order to show some of the people what we are doing, and whether it was practical or not, we devised this scheme through the suggestion of Mr. Dennis to have a night class for the farmers. The first thing we took up was the Babcock Milk Testing Machine for testing cream and skimmed milk. Before I pass this picture, this is our soils laboratory. We have polished tables that we use where they sit around when they recite. We have a very elaborate equipment for a school of the kind, and we are doing agronomy which they are doing at State College in the same manner as far as possible, as they are doing it down there. Some of the boys are so old that we can do that work this year and I hope to be able to get the credit for that work.

Another thing we took up in the night school was feed and feeding and plant foods in their chemical state, the lime question, and last of all we organized a milk testing association and we had 50 at the last meeting. Mr. Tompkins, of State College, was there and Mr. Dorsett was present, and had absolutely no trouble in organizing a milk testing association which, I think, is going to prove very successful for the community. I hope I have not imposed upon your patience and I want to close with a thought from Garfield who, I think, paid the greatest tribute to agriculture in the fewest words of any man I know of when he said, that ahead of all sciences, ahead of all arts, ahead of all civilization and progress, stands, not militarism, the science that kills, not commerce, the art which accumulates wealth, but agriculture, the mother of industry, and the maintainer of human life.

CENTRALIZATION OF PUBLIC SCHOOLS

By E. B. DORSETT, *Mansfield, Pa.*

Whenever a public writer or speaker is at loss for a subject upon which to express his views, he either selects the "Public School" or the "High Cost of Living;" little realizing how closely the two subjects are related. Few, indeed, are the number who have studied the close relation that one bears the other, but have felt that the most serious condition of country life, as we find it to-day, is the silent but startling migration of our rural people to the towns and cities. Country people are moving in to secure better school advantages for their children, which they are unable to get in many of our public schools. This reduces the number of producers and increases the number of consumers, thereby raising the cost of living. This pernicious practice is not only draining our farm homes of their brightest boys and girls, but is removing from the farms men and women in the prime of life, who are most needed to maintain a rural citizenship.

The type of citizenship in any community should be of such a character as will instill in the minds of its people a desire to build up and maintain better social and educational facilities. There can be little incentive to do this if these facilities are to be found only in our towns and cities. The fundamental problem of country life is that of keeping a standard people upon our farms, and in making life on the farm more attractive and remunerative. This can only be done by providing efficient schools, such as will meet the needs and supply the wants of our boys and girls. Years ago the rural school was the center of attraction. Singing schools, spelling schools and literary societies made it the life of the neighborhood. The school system then fitted the needs of the rural people. To-day, owing to industrial and educational changes, the old public school of the past has gone never to return again. We must have a redirected school system and it must be directed in part, at least, by those whom it is to serve. All mankind, and especially the farmers, should be deeply concerned in this readjustment of the rural school.

THE FARMERS' VIEWPOINT

The administration of our schools and the burden of raising the taxes, rests largely upon the tillers of the soil. It is my purpose then to give you the farmers' viewpoint of the farmers' school. The making of the courses of study, the manner in which they shall be imparted to our children, the framing of the laws governing our schools, is almost invariably turned over to the professional educator, or politician, who, however excellent may be their motives, have limitations the same as the rest of us, and see only one side of the question, and that is the professional one.

Extending back to the days of Horace Mann, the father of our educational system, our schools have been built upon the beautiful theory that every American child shall have a college education.

This sounds well from the platform, reads well from the printed page, but never has and never will work out in actual practice. Building upon this theory, we have correlated our educational system. We began at the top instead of the bottom of the ladder. Between the Public School and the College, there is a broad and deep chasm; so high and so wide, that only about five per centum of our boys and girls ever cross it. We owe much to the pedagog of old New England for the impractical and inefficient school system under which we have been working for a half a century. It is time that the farmers should have something to say about who shall teach and what shall be taught their boys and girls.

CENTRALIZATION OR CONSOLIDATION

In an Act of 1901, the word "Centralization' is defined as follows: "That for the purpose of this Act, the word 'Centralization' is hereby defined as a system of schools in a township providing for the abolishment of all sub-districts and the conveyance of pupils to one or more central schools."

When the Pennsylvania School Code was enacted in 1911, all the previous legislation referring to consolidation, transportation and centralization was repealed and in its place the following sections referring to the subject of consolidation were enacted.

"The Board of School Directors of any school district in this Commonwealth may, on account of the small number of pupils in attendance, or the condition of the then existing school building, or for the purpose of better gradation and classification, or for economical or other reasons, may close and consolidate any one or more of the public schools in its district, and, upon such school or schools being closed, the pupils who belong to the same shall be assigned to other schools: Provided, That in any district of the fourth class, pupils who belong to any such closed school, and reside one and one-half miles or more from the school to which they are assigned, shall be furnished proper transportation at the expense of the district, to and from the school to which they are assigned."

It would thus seem that under the School Code, "Consolidation" rather than "Centralization" is the term to be used.

EDUCATION DEFINED

"Education is a reconstruction of our experiences." This is a short, concise yet comprehensive definition. Much of the subject matter that is taught in our public schools to-day has no relationship whatever with the experiences of the boys and girls on the farm. Hence, much of the teaching is meaningless and worthless to them. Culture is the object sought in obtaining an education. Not so many years ago it was quite generally believed that this could only be obtained by studying dead languages and higher mathematics. To-day we know that culture can be obtained just as readily by studying the things which are practical as in studying those which are not. The question of how and where they shall get their culture of training, is of but little moment, so long as they get it.

RURAL CHILDREN NEGLECTED

The most pressing problem of the public school and especially the rural school, is the problem of giving every child in rural communities a good common school education. To do this, it becomes necessary to first get them into our schools and then hold them there long enough to secure the necessary training. As the burden of maintaining our public schools rests most heavily upon the farmer, and as his children are the ones most directly benefited, it is time that he took a more active interest in perfecting a practical and intelligent school system. To provide every child of school age in his community with a good school and to keep that school in operation eight or nine months out of the year, requires a vast expenditure of money, as good schools cannot be had without some sacrifice. The rural school of to-day, as compared with that of a generation ago, is much less efficient in the training of our boys and girls. Then these schools were attended by large numbers of boys and girls who remained in them until they were full grown men and women. They were taught by the brightest minds in the community, often, during the winter, by college students and during the summer by women from the Normal school or academy.

THE SCHOOL OF TODAY

The rural school of today is taught, in most cases, by young, inexperienced, half-trained and often inefficient teachers, who lack in professional ideals and ambitions. They may be divided into three general classes: The raw apprentice class who expect to teach until a better position is offered them in the town or city; the marriageable class who teach until they get married, and the old stagers who are too inefficient to get positions elsewhere. Again, many of the teachers are from the town or city and are not in sympathy with farm life and know nothing of the real needs of the children. When Friday night comes they go back to their homes and do not return until Monday morning. Such a teacher can be of but little use in the school room and should never be elected to a position in a rural school.

SCHOOLS TOO SMALL

The attendance in many of our rural schools is so small that the teacher cannot do good work. Thus it has come about that many of our schools have too few pupils to stimulate the teacher to do his best work or to give the pupils that very important part of his education which comes from contact with his fellows. This condition is greatly aggravated when there are not pupils enough in the class for mind to come in contact with mind in the daily recitation or on the playground. While it cannot be claimed that consolidation offers a panacea for all the ills of the rural school, because there are many sections of our State where it would be exceedingly difficult, if not impossible, yet the movement thus far has been very satisfactory and is changing our whole school system. Undoubtedly the work will be extended and will become an important factor in solving the problem of the rural school. It adds another agency for breaking down the barriers of isolation and stagnation which so often have kept the farmer out of harmony with the world in which he lives, and which have caused the farmers' children to leave the country for the greater attractions and greater uncertainties of the city.

CONSOLIDATION MEANS BETTER ORGANIZATION

With consolidation of the rural schools will come very much wider opportunities for the enrichment of the courses of study by the introduction of those subjects which are most directly related to the improvement of agriculture and to the inculcation of a love of country life in the boys and girls on our farms. All around our rural schools lies a wealth of material, which, thus far, has been almost entirely neglected for the lack of knowledge and the absence of the skilled teacher. In the modern consolidated school will be found teachers of experience, well equipped and properly trained to organize the work entrusted to their keeping and correlate theory with practice.

Mankind in general, and teachers in particular, are indebted to science for the knowledge which enables them to point out the real relation which exists between certain facts and phenomena and the daily pursuits of man. In recent years much information has been gained in the study of those things in nature with which the farmer has to deal. The teacher is now able to unlock the secrets of the air, plant, soil and the animal and make them the common property of the child. The teacher, as never before, is now in a position to explain the activities of the natural world and of the advantages that may be taken of these activities. The nature of the soil as related to the crop which will grow in it, the life of the plant as related to the amount of grain, or forage, or fruit it will bear, the body of the animal as related to the food which it requires for maintenance or growth, the life history of injurious insects as related to the means for their repression. These are some of the things which the teacher, through the aid of science, has now to offer the boys and girls who intend to remain on the farm.

BENEFITS DERIVED

Consolidation of schools will have a tendency to unite the farmers who pay the taxes and support the schools, the home makers, the teachers, and the pupils into a co-operative organization for the betterment of rural education. It will instill in the minds of the boys and girls higher ideals of citizenship. The school will become a character builder, and the districts will be rid of those agencies which destroy character, namely, unkept school yards, foul and unsightly outhouses, poorly equipped and illy planned school houses, young, inexperienced and too often inefficient teachers. It will give a broader and more practical school course and in short better equip the boys and girls to fight lifes' battles.

CONSOLIDATION MEANS PROGRESS

It was not so many years ago that one dared to criticise the public school. To do so was considered an act of treason. The little red schoolhouse was both idealized and idolized. It was the backbone of our civilization and an index of progress. In recent years the one-room schoolhouse has become the target, not only of the critic outside of the school, but also of those who are directly associated and most vitally interested in our public school system. Sentiment in rural districts is rapidly crystalizing in favor of consolidation. Instead of conducting a dozen district schools in a more or less efficient manner, with a given number of buildings to heat, equip and keep in repair, the children are carried to one central point where they are given the advantages of a graded, or better still, a high school of first grade.

This method of dealing with the rural school problem is becoming more and more popular where it has been tried out. It marks the beginning of a new school system, one that will be both cultural and practical. It ushers in what will some day be known as the Agricultural Age. It will put the boys and girls in rural districts in touch with an educational system that will be continuous; one that will best fit them for the work they are to take up when they leave school. This is something that has not been in the schools of the past and is not being done in many of the schools of to-day. In fact, there is no correlation between the work that is being done in many a school room and that which is to be done by the boys and girls after they leave the school. With the advent of the consolidated school, all this is changed, and we find the boys and girls actually studying the problems that will confront them when the dreams of youth have passed and life becomes a reality.

CONCLUSION

Betts and Hall's "Better Rural Schools," says: "Great movements and deep-seated reforms never come by chance. They are always produced by adequate causes, by forces that are consciously set in motion and carefully administered. There is still a great amount of social inertia to overcome and of ignorance and selfishness to be removed, before rural education comes fully into its own. Indifference to educational needs and advantages is still the rule in many communities. Prejudice yet obtains in hundreds of districts not only against the consolidation of schools, but against all improvements.

"These conditions must be wisely and courageously met. They cannot be overcome by fine theories nor by the appointment of educational commissions. The passing of wise laws and the adoption of helpful resolutions may be a step in the right direction, but without the winning of the people most concerned all these things will prove futile and fruitless. The reform now being sought in rural education will require hand-to-hand work, and almost a house-to-house canvass, to instruct, inform, convince and convert. A doubter must be persuaded here and a skeptic won over there; a stingy man must be stirred into seeing greater value in his children and their future than in his stocks and his farm; here an obstacle will need to be removed from the way of progress, and again enthusiasm will have to be created and maintained; movements already started must be cherished; projects that advance but slowly must be hastened; steps taken in wrong directions must be checked, and every phase of the situation watched with the greatest wisdom and care."

THE COUNTRY CHURCH

By REV. B. MONROE POSTEN, *Pottstown, Pa.*

I have been pastor for twenty-two years in the country and am not looking at this problem from a ten story window in the city. I have purposely worked in a number of sections of both New York State and Pennsylvania. I wanted to find out conditions for myself. I have found some interesting facts, but mighty little help in solving the problem. After I had seen what had been done with some of the timbers raised in my little churches, for instance, the pastor of one of the largest churches outside New York City, the Superintendent of City Missions, one of the leading physicians of Buffalo, pastor of a large church in New Jersey, principal of one of New Jersey's best schools, all were from my churches, I dedicated my life to the country church. I felt if I could only win one such as either of these, my work would not have been in vain.

That the country church is in danger is not a false alarm. It is true. Reports of investigations show fully 65% are dying or are already dead. A great many of these were so situated it were better if they never had been. Sixty per cent. of our great population live in the country, with 6,361,502 farms, valued at forty one million dollars. But it is estimated that in 1950 we will have two hundred million people, of which perhaps one hundred twenty million will live in the country.

What about the feeding of this great flock?

No one doubts that the farm is the basis of all industry, but it is more than that. It furnishes a large per cent. of the best men for all purposes. In Chicago, twelve of her greatest preachers, 75 of her leading machinists, 80 greatest lawyers were raised in the country. The Scriptures furnish an abundant record: Moses with his rod; Shamgar with his ox-goad; David with his sling; Gideon, &c., suffice. In Boston 87% of salaried men were raised in the country while 80% of pauper labor were raised in the city. Of 5,000 delegates to a world-wide alliance, 85% of this cream of a great denomination were raised in the country.

It is easy to collect figures to show failure of crops and stock, but who will say figures can tell the truth about moral failures? For instance, in our own State it cost $200,000 to take care of the criminals of just one family in just a few years. Suppose this family had been producers of good stock of men and women, figures would be powerless to show the benefit as they are now to show the loss.

The church must make it possible to produce men of the type of Washington and Lincoln. As long as the helmet of salvation is lacking, little Davids can slay giants as it exposes the target for pebbles. We need men to-day whose presence will inspire as much as the addition of 1,000 men. It takes more manhood in bloodless battle than in open warfare. If the prediction that in ten years all farms will be in the hands of scientific farmers trained for a better agriculture come true, does it not go with the saying, it will make a mighty difference in the kind of characters they possess? A successful farmer must include the HOME as well as crops and stocks. It is just as humanitarian to raise good crops as to send a gift to the sufferers across the water; more so. The farmer must be taught that as he increases the nutritive value of his crop he increases the health of his nation. The church must present the Divine claims upon him as well as the claim of his fellows. Give me men and I can make their own atmosphere and environment. The gravest danger to-day is secularism. No work is secular that is worth doing at all. We must hold to moral standards and methods of helpfulness.

If we had Christian ideals in the Old World we would have no such war.

We must put the Divine into all human relations. Great leaders in agriculture as well as education look for and need the sympathy of the church. They ought to have it. The top notch soil and highest grade school need the engine which the church should furnish. Ford car assembled in 30 minutes was run 7 miles, then it stopped when upon examination it was found it had no engine it was easy explained however it run on its merit. The church and farmers' institutes could work wonders, the church for inspiration, the institute with plans.

To-day is a crisis in the whole worlds' history. See the great discontent and want of confidence. You cannot stop it by driving it beneath the surface. To me this is the biggest asset to the whole thing. If the farmers, as a class, were not included in this discontent, there would be room for doubt. His discontent shows a door of opportunity.

Opportunity has chin whiskers and is bald headed. Catch it as it come or be forever too late. The blind staggering multitude want a guide. No living on memories of past achievements, or glorying in ecclesiastical respectability with half dead membership can solve the problem we are looking at. The church that will win must be larger than denominationalism. If denominationalism should die to-day we could solve the problem to-morrow.

No church will ever raise any higher than the expectations of its pastor, and no pastor's expectations any higher than the school to which he owes his life. We need more than anything a new rural leadership. The country church is forsaken by the ministry. That is, they go there to get a start, using it only as a stepping-stone. This is most unworthy of any man.

The country church has been killed by the disinterestedness of the cloth. The heads of the denominations are not without blame. Sending pigmies to do giant's tasks without even the skill to use the sling. You can not save the souls of a farming community without you take account of the body and mind of his family and make much of a job of it. Under some conditions I have found lots of them without much of a soul to save.

Wherever there has been a real successful country life, religion has had a very prominent part in making it so. We have given the farmer new machinery, new methods, then we thought he was free. Like the freedom of the slaves, we forgot we did not change the shape of their head and expected too much of them.

We must give the farmer a new relationship to his calling. The more science you give a man without leveling it up with grace, the weaker the man or men. The country church must minister to every home and help every individual in this territory or it has not done its work.

Show me the church and I will tell you the country condition. The church must teach co-operation by deeds. The home, the church and the school must pull together, then we have a real farmers' union. When all parts hold a right relationship to each other then we can have an ideal community.

Every man must devote himself to the betterment of the whole community. We need a new social consciousness while we are figuring for better prices for our crops and stock. The greater part of the migration to towns by the farmers has come from a failure to see his own responsibility to the community. The farmer is a real necessity and must be made to carry this responsibility. A sick hen will have plenty of night visitors, every louse and mite will call at night; poor soil invites all the vile weeds, so the sickly church in the country has invited all the disorders that are attendant upon disease.

The country church must teach that "get-rich-quick" schemes are from low desire. Godliness with contentment is great gain. That would half solve the boy problem. A boot-black, shining a cripple's shoes refused additional charges for double work required, saying: "I don't want to make money off other peoples misfortunes." He had the right spirit.

There is no place where the spiritual life is susceptible of as high attainment as in the country. Every truth has a double meaning here. The farmer will always listen to a man with a message to him. But it must be to *him*. Dr. Philips, first talked about horses, then cows, then school, each time showing ignorance. One day he spoke of siloes and he was invited into an intimate relation to that home.

My own observation is that the farmer's son is worth two city chaps under same conditions. This ought to appeal to the ministry. We hear once in a while that farmers won't get together or get together so far apart. That comes from trying to hold together from the outside. The church is the only institution that can work on the inside, therefore it has a great responsibility. The Lord's Prayer is the expression of a Divine co-operative commonwealth upon its knees. It asks for everything else before it asks for bread. Until the country church can pray this prayer truly, its power will be only over a few people but when it sees the whole community before it seeks selfish satisfactions, it will save the community.

I have met with churches that were too holy to hold institutes in; maybe they were good, but good-for-nothing. The church has been so intently interested in staying beside the cemetery that they are competitors for greatest degree of lifelessness. I saw a sign the other day. *"If it is not electric it is not modern;"* so a church today must electrify the life of the farmer. It is a crime to waste the Lord's money in trying to do his work in the country without trained men whose work does not overlap.

We must develop a family religion. What made the lack of reverence in the country when the family altar fell down, irreverence like all weed seed, grew in its place. Anything forced upon the farmer from the outside does him little good; for instance some good salesman sells him a piano with no one to play it. He teaches a child music, then he has a real use for it.

The best book on agriculture is the Bible. The biggest job to-day is the country minister. The country church is not a failure because it has not been tried. We need to hitch our work to a star of hope. We sing, "We walk with the King;" we need to work with the King as farmers. Some inspiration in that. The successful farmer must be his own greatest competitor. Nothing to beat another, but great honor to beat his best effort. Dan Patch, when he clipped another second off his own record, counted.

The evil influences of the hired man is another thing the church must take up. A large per cent. of them are not fit companions for the farmer's son.

Whatever affects humanity effects the church. Too many people think the church has no business in some matters. Of course she must not be simply meddlesome, but be possessed of the spirit of the Master. She must not only save the top soil of humanity, but the subsoil. We need no adulteration of or diluted Christianity. When the country church stands for the highest standards, for loftiest aims and noble purposes and greater unselfishness, then it will do much for the farmer and as much towards a larger rural population.

Knitting men together without love is a farce. All involuntary combinations is dangerous. It is like the apple that appears to be ripe and you find a worm is the cause of its changed color. Men are sometimes organized because of circumstances, these always fail. Nothing but love of the cause and love of each other can make a farmer's organization that will be worth the name. The men who have killed the country church are those who have made it a comparative organization. It is one that is different and must always be. No right to compare it to a lodge or union or club. All are useful.

SOME OF MY PLANS

I keep a close watch upon possible removals or sales of property near enough to my church to effect it, then look for customers whose coming to us will raise the standard. In this I have had some success.

I keep in touch with every farmer, his stock, are all part of my concern. Have only this last year attended to hundreds of cases of diseased poultry always without charge. I allow nothing he has to do or contend with to be foreign to me. I have found a month's work in farmers' institutes of more benefit to me than all my other training combined. I have heard him ask a lot of questions and heard them well answered. I read more farm papers than religious publications. We are having school for learners in plain sewing as well as embroidery and art work each Saturday afternoon, that is helpful.

We have children's play day Saturday afternoon when we try to learn the art of playing fair with each other. One failure with the country folk is that they have had little play together to learn co-operation.

I am now planning a campaign to install 150 bath tubs in my circuit. One of the physicians said, "Put me down for No. 1; that's real religion."

What is education for? To make men good citizens, not to make them better men than those who are less fortunate, but to make them able to help those who are not so well educated. The Lord's Prayer is nothing but a Divine co-operative commonwealth on its knees. There is not a selfish petition in it.

Our Father which art in Heaven, child speaks;
Hallowed be thy name, worshipper speaks to his God;
Thy Kingdom come, citizen speaks to the King;
Thy will be done, servant to his Master;

Give us this day our daily bread, beggar speaks to the philanthropist;
Forgive us our trespasses, sinner speaks to his Saviour;
Lead us not into temptation, pilgrim appeals to a guide;
Deliver us from evil, captive cries to a deliverer.

Prays for all the world before he prays for his own daily bread. Gives up his own will before he asks for a selfish thing, then he asks bread so he may be able to do something for others.

Do you know that the soul that tries to carry its own burdens alone soon becomes like the Dead Sea. No birds come and no grass can grow anywhere around. Do you know there is no way to world conquest that is not through Gethsemane and Calvary of self-interests.

The church has done lots in the past 50 years; hospitals, insane asylums, reading-rooms. But it needs to go a step farther and make these institutions free from occupants. We need to help misery, but better, make conditions so misery cannot live.

The good Samaritan was all right, but I would a good bit rather a man had arisen who made the good Samaritan unnecessary.

A DEFINITE PROGRAM IN BREEDING FOR EGG PRODUCTION

PROF. JAMES E. RICE, *In Charge of Poultry Husbandry, Cornell University, Ithaca, N. Y.*

Mr. Chairman, Dr. Martin and Friends: I think this is the third or the fourth time that I have had the privilege of meeting with this Board, and I assure you that I appreciate the honor and the opportunity. Pennsylvania is a great State; it has made a great history for itself, not only in agriculture but in its Institute work. I feel that coming here more or less as a specialist in Poultry Husbandry, that I am talking to persons who, perhaps, may give respectful attention, but whose business primarily is in some other branch of agriculture. If I speak more as a specialist, talking to persons who are directly interested in keeping poultry or in teaching poultry husbandry in Farmers' Institutes, you will know that I do it thoroughly understanding the situation and appealing to your consideration to listen as patiently as possible if you think the subject is being dealt with more technically than it ordinarily would be handled with farmers.

We are making wonderful strides in our knowledge of poultry husbandry. Unquestionably there is vastly more, however, to be known than we know at the present time. We must look to the practical solution of these problems that confront us, and some of them are exceedingly difficult and serious through a combination of forces. We need to have the scientific investigator at the expense of the State or the National government, trying out some of the things that are too expensive for the individual poultry man to do for himself, and we need the practical poultry man to put these things to the test. After all, it is the person who, on the farm, is caring for the hens, that is most likely to have the correct perspective of things, because he tries these things out in the crucible of every-day experience and he puts them to a dollar and cent test. Any scientific, or so-called scientific theory of inheritance, of breeding or nutrition or of poultry house construction or of incubating or rearing that cannot stand the test of the practical poultry man's use in making money with poultry on his farm, generally is not a correct theory and not a sound conclusion.

The subject assigned this morning is a specific one, the "Breeding of Poultry for Egg Production." The development of poultry husbandry in the East has been very largely along the egg producing line, because it has appeared to be the most profitable field up to the present time. I predict, however, that the day is not far distant when we shall have greater knowledge of the meat-producing values of poultry and that we shall give it quite as complete specific attention in our breeding. The industry needs it and there certainly is a wonderful field for development along the line of quick maturity of birds for meat production, having specially well developed bodies that will best meet the needs of the table as well as the production of high quality eggs. In a measure these two qualities can be worked out in the same individual, with perhaps as great money value in dollars and cents profit when all the factors are taken into consideration. I say this by way of explanation lest I be understood as thinking that we were ignoring the great meat qualities that always must be taken into consideration in any system of cost accounting of profits on a poultry farm.

The question of breeding poultry is especially important at the present time, due primarily to the increasing cost of the other factors of production. It costs us more to-day to feed our fowls than it did formerly, therefore it behooves us to see to it that the machines that we use in our manufacture of eggs and meat are of the very best quality, otherwise our food cannot be fed to the best possible advantage. With the higher price of house construction—because we are learning now the need of a good house if we are going to get the very best results in feeding or breeding, and with the increased cost of labor, reduced of course by various methods of labor saving appliances, but generally difficult to secure to work on the farm at reasonable rates, due to the competition of other industries, make it especially important that the birds that we do have shall all be good ones. Then taking into consideration the demand of the more critical public for a higher quality of product, it is absolutely essential for the person to-day who makes the best use of his poultry, to have birds that lay high quality eggs. They must have quality to compete and bring the prices.

We find that in trying to carry out this plan to secure a better quality and larger quantity of poultry that we have some exceedingly difficult problems to confront. It is a more difficult problem to breed poultry scientifically and well than it is to breed most other kinds of domestic animals, not because they are not more responsive. I think that poultry is moulded in the hands of man as freely as any other kind of animal and perhaps more so than most of them, but it is because of the fact that the flock of poultry has so many in numbers and the individuals are so small, so short lived and so comparatively inexpensive that a person finds it exceedingly expensive and very difficult to carry out any systematic program of breeding, covering a period of years.

Let me illustrate with a flock of fowls: In order to know individual merit, it is necessary to record the bird's pedigree, leg band them, trap-nest them and gather the eggs five or more times a day, hatch the chicks, leg band and replace the leg bands, and make the records of the changes in leg bands as the chickens outgrow them and keep the records of all that is done. With a dairy of cows having instead of several hundred individuals to go through the laborious process that I have outlined with chickens, we have one tenth as many or less individuals and have only to use a milk scale twice a day, or weigh less frequently and to use the Babcock Tester occasionally and we can tell our best individuals. When we finally have the record of the hens, they are with us only two or three years at most. When we have the record of the cow and establish the fact that she is a good one, we have her for eight or ten or twelve years. You see, therefore, the great expense and the intricate amount of careful record keeping involved if we are going to be as careful and as systematic in the breeding of our poultry as we are in breeding some of our other domestic animals.

Notwithstanding all these difficulties, it pays to keep some kind of account of the difference in quality of our birds and to breed accordingly. However, we may not use trap nests the year round. We may not possibly use trap nests at all, but we had better use them for at least a few months in the fall as a check on the accuracy of our observations of external characteristics. We are seeking a way to find out how to pick out the more productive hens from the less productive hens and the more valuable males from the less valuable males, in order that we may mate more intelligently. Even if we cannot know absolutely what the records of the birds are to an egg or to know whether these birds actually have pre-potent powers of transmitting these qualities to the next generation, we can get a good general idea of their value. In order to bring out some of these facts, I want to take a little of your time to-day.

There are at least ten points that we ought to try to accomplish in the breeding of our poultry for better egg production. These will be brought out and illustrated as I talk; but I want to emphasize two or three of the more important ones right now. First of all, we must see to it that our birds have strong vitality and great native inborn constitutional vigor. That is the foundation and the cornerstone of success. Whatever other factor is involved, whatever other character may be considered, that one, above all others, should be the one on which we base our procedure because without the native vigor to stand up under heavy feeding, we never can expect to get a big response in growth or egg yield. We need also to have pure bred birds of some well known breed as our foundation. The poultry man who to-day is satisfied with anything short of a good, pure breed of some one of half a dozen or more of our well known varieties, such as Rocks or Wyandottes or Rhode Island Reds or Leghorns or a number of others I might mention, is not living up to his immediate opportunities, because one can buy in any neighborhood with only a little additional expense for eggs or chickens, breeding quality that has taken men 50 to 75 or more years to bring up to its present state of perfection. You have then secured a foundation of uniform type as regards size and color, quality of egg, and of reasonably good production and good constitutional vigor if care is used in selection. We also need to have birds that have inherited a tendency to long life. The greatest handicap to-day to the poultry business is the comparatively short life of our birds. In Nature they might live 10 or 15 years or more; I have known them 13 years old in domestigation. We have a number of hens in the college flock now that are 6 years old, many of them laying fairly well. We want to impress the inherited quality of longevity upon our birds because we know that if a bird is born with a vigorous constitution and the inherited tendency to long life, it will be easier to rear the chickens; we will be getting individuals that can stay with us for a period of years and make it unnecessary for us to go to the most hazardous, most difficult, and most expensive process connected with poultry farming, namely, the hatching and rearing each year of as many or more chickens as we have mature fowls on the place. With the present normal life of our domestic fowl, a profitable life of only two or three years at most, it is necessary for every poultryman in the country to hatch and rear each year as many chickens as he has capacity for mature hens on his farm. A 1,000 hen farm must rear every year at least 1,000, and ought to rear 1,200 or 1,500 chickens in order to allow rigid selection. If we can by any means develop birds with longer lives so that we can keep them 3, 4 or 5 years as choice selected individuals to breed from, then we are impressing quality of longevity and we do not have to go to that heavy expense of rearing so many chickens each year.

We need to develop the quality of producing fertile, hatchable eggs. Many a man has succeeded well in getting high egg production but failed to hatch the chickens. There seems to be a limit to the endurance of a hen to produce 150, 175, 200 or 250 eggs a year and have enough vitality left to give us healthy offspring. The dairymen know what that means when they push their cows to the limit. It is the same with the hens. We must get reasonably high yields but this must be consistent with vitality in order that these birds will give us chickens as strong as their parents. If the poultryman cannot so organize his methods of breeding, feeding, housing and care that the next generation is going to be as good or better from the standpoint of fertility and hatching power and vitality, it will only be a few years before that person is out of the chicken business. Many a person has gone out by that doorway. There are some things that we know about breeding poultry, but not all. This question of securing heavy production, good fertility and strong hatching power is, at the present time, the most difficult thing we have to confront in breeding.

The next factor that we must consider is the question of quality of eggs. It is not simply the number of eggs that the hens lay that determine the profit. In my humble judgment we have been "barking up the wrong tree" a good share of the time in this question of breeding for egg production. The quickest results and the best paying results can be secured, not by increasing the egg yield even one egg per hen, but by improving the quality of the eggs that they lay. A person can increase the actual money earning power per hen anywhere from 25c to 75c per hen per year just by changing the size, shape and color of the egg without any particular extra effort on the part of the hen to produce this better quality. That is the easiest improvement to be made at the present time and yet it is one that is very seldom discussed or systematically practiced to any great extent.

Without attempting to go into details on some of the other factors to be considered, we will now have the lantern slides and bring out some of these points step by step in developing our subject. We will begin with the first factor, namely, that of constitutional vigor. We can always see things better by contrasts, so I have made a slide of one of the most abnormal, one of the worst possible specimens of low vitality. This bird actually existed. I photographed it myself and have pointed out by descriptive terms some of the vulnerable physical evidences of weakness which mark the individual. Most emphatically there is such a thing as constitutional vigor characteristics indicating strength or weakness that any person who is familiar with birds and who will study these characters can see for himself or herself and can pick out the birds of high and low vitality. I will guarantee to take this audience or any body of students and with one hour's talk with lantern slides and with the birds themselves, which is better than the lantern slides, make a large proportion of the class perfectly familiar with these characters so they can walk right in and pick out the birds of higher or lower vitality with almost unmistakable accuracy whether we are dealing with little chicks or with old fowls.

Let us briefly, with 3 or 4 lantern slides, point out some of these fundamental body characters that indicate vitality so that on going home you can go into your flock of birds and see whether you have among them any that show these particular physical characters. First of all, you will notice, as you examine that bird (Fig. 1) that it is developed abnormally, that it has an especially long, thin beak, thin body, long thin legs and shanks and long thin toes. The bird has simply responded physically to a weak constitution and Nature seems to understand that if a bird is unable to take care of itself, is not rugged, is not physically vigorous, that certain parts of its body grow while the others dwarf and stay dormant, so that the bird naturally takes on certain body characteristics as you can see by its attitude. It has a crouched position entirely abnormal. It does not stand up rugged and vigorous and virile. Is in a "dopey" sort of a condition. Therefore, look for the long flat thin head and beak, which we speak of as "crow-headed." Notice that generally there is a small, thin, pale comb; a dull, sunken eye, and drooping eyelids, thus indicating that it hasn't the life or vitality to keep its eyes open. Notice that there is a very sparse and irregular development of the plumage. A bird of high vitality generally is well plumed, glossy, full feathered, heavily feathered and quickly feathered. Note especially that they have a tucked up abdomen and a small development of the abdominal tract. Notice also that they generally have narrow, breasts, narrow from side to side also from the back to the keel. These, generally then, are the main factors indicating low vitality. Primarily the differences are in the body capacity. Look for small body capacity, with low vitality, as contrasted with a very large, heavy body capacity with high vitality.

Perhaps you can see that better represented in Fig. 2 by super-imposing two Plymouth Rocks, one over the other. The low vitality bird is in white and the high vitality bird is in black. Now these were birds of the same age, and as you will see, almost of the same height, yet there were at least 2 pounds or more difference in weight. You will notice that all of the general characters that I mentioned in the previous slides are true here. Take this low vitality bird for example; there is a long, thin, flat beak, a thin neck, a thin keel, and a tucked up abdomen. There are the long legs and long shanks as compared to the high vitality individual that has such wonderful depth from back to abdomen, from back to keel, a heavy neck with a well rounded head, a medium to large comb, a heavy curved beak, heavy shanks. There in black is a high vitality bird. He is a splendid specimen of a Plymouth Rock from a constitutional vigor standpoint. This male unquestionably showed these characters from a baby chick right on up to full maturity and is worth infinitely more to kill to eat than the other one. He is a perfectly good specimen from the standpoint of his vitality for breeding purposes. The low vitality bird would not be worth anything from a breeding standpoint. Perhaps you can see the same idea brought out a little more graphically with the same individuals from a different photograph. (Fig. 3.) Here are the same two Barred Plymouth Rocks shown separately. By placing a parallelogram of the same size over the low vitality bird that you do over the high vitality bird here, you can see that the high vitality individual has a tendency to fill the parallelogram; the breast is full and deep so that it nearly fills it in front, and the abdomen is so full that it nearly fills it at the rear. We see that a bird of high vitality has the tendency to fill a parallelogram while a bird of low vitality is deficient in breast and abdomen. Notice the difference between that vacancy in the parallelogram at the breast and abdomen. That is the most convincing view you can get of birds of high or low vitality, and the same contrast would be true if you were looking at the birds from the rear or from the front, because the bird of high vitality is broad across the back and keel as compared to the bird of low vitality, which has a narrow back, narrow keel and is narrow between the legs. Frequently birds of low vitality have legs so close together that they nearly interfere. The bird of high vitality viewed from the front, the rear or the side fills a parallelogram while the bird of low vitality is more likely to fill a triangle. The same thing is true of the baby chicks. There is a baby chick (Fig. 4A) that is full of vigor, hard, full, round and plump, with an abundance of down lying close to the body. Here is another one, A, with its eye standing right out like a shoe button, the eye is full and expressive, the beak well curved and of good color, the chicken vigorous and active. One could have observed the vitality of these chickens even more accurately in life than by photographs. There is a chicken marked B of the same hatch, out of the same incubator. It has low vitality, and is a weak yeeping individual that probably will not live long; if it does live, it will be a "delusion and a snare"

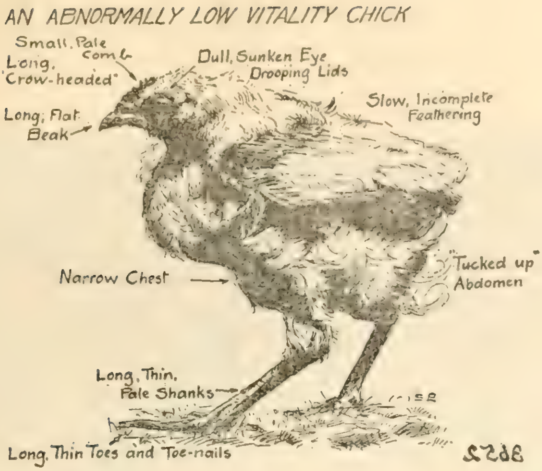


Fig. 1. An abnormally low vitality chick. Note the physical characteristics which indicate loss of physical vigor.

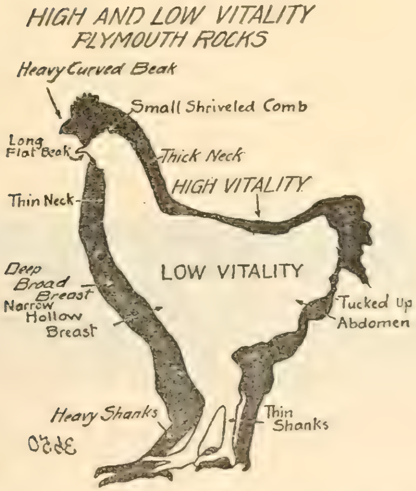


Fig. 2. Two Barred Plymouth Rocks. One high and the other low vitality, of similar age. Note the points of contrasts.

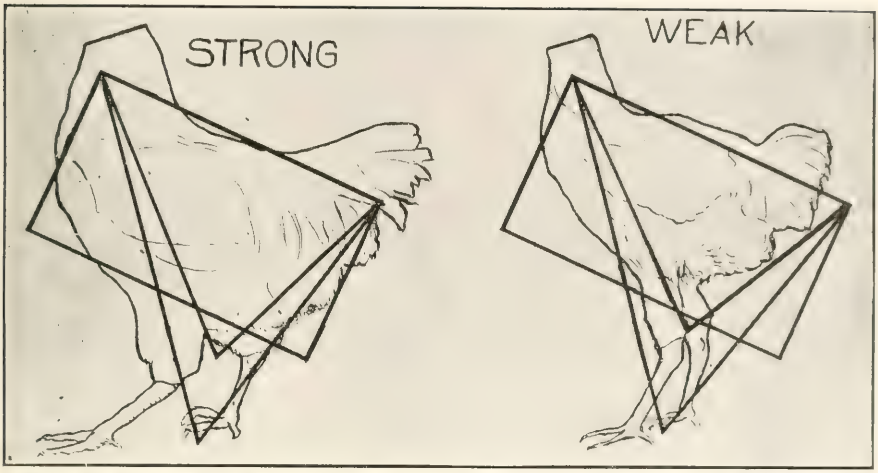


Fig. 3. Showing the way in which birds of high and low vitality fill a parallelogram and the two triangles. This clearly brings out the points of weakness in development of keel, breast and abdomen in the low vitality bird.

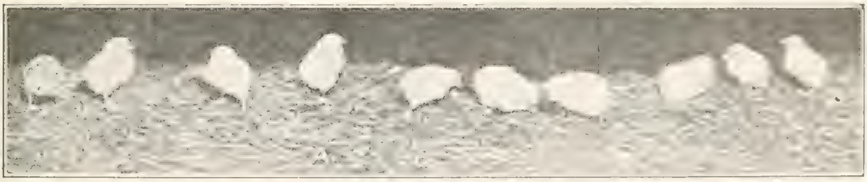


Fig. 4. Baby chicks just removed from the incubator. Note the difference in size, shape, and attitude of the body between A and B.

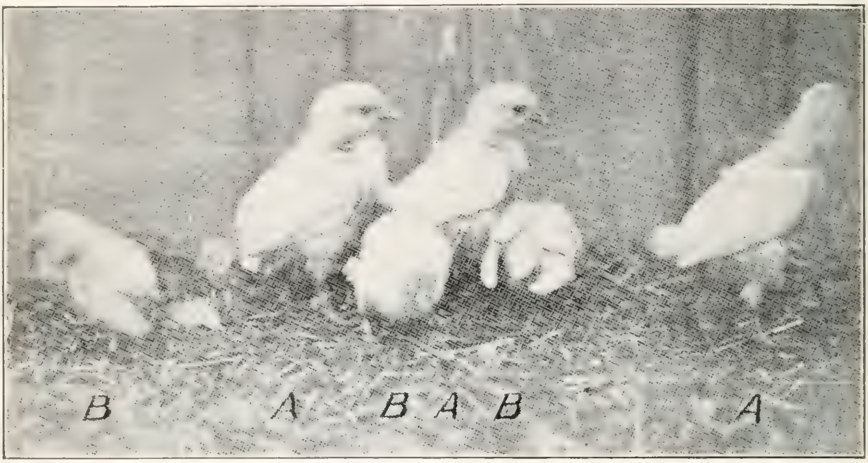


Fig. 5. Chicks 10 days old. Observe that in Group A the chicks are of larger size and with better developed wings and tail and with feathers close to the body, as compared with Group B.

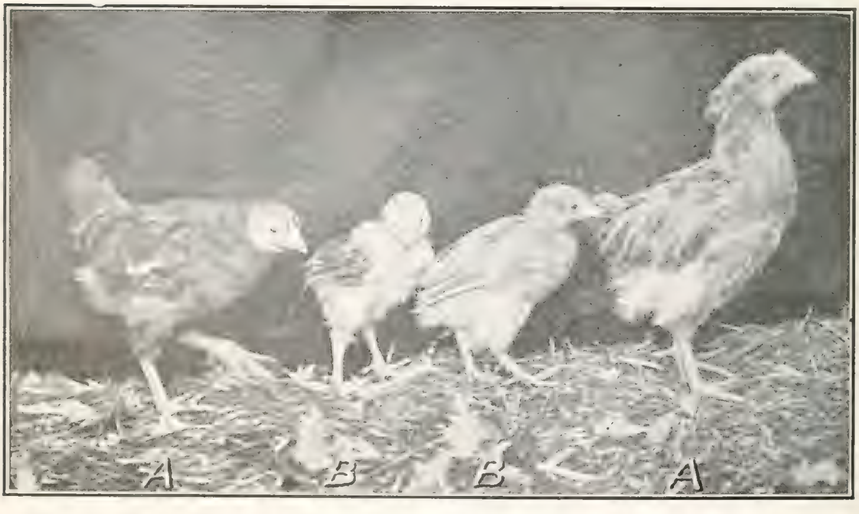


Fig. 6. Four chickens of the same variety, age and method of rearing. The difference in size is apparently due to an inherited weakness.

so long as you have it on the farm. Here is another (Fig. 4 B). There you see that same tendency to narrow chest, tucked up abdomen, and in the course of two weeks you see the same type of chickens. Notice that these three high vitality chickens (Fig. 5), with full developed bodies, strong wing pads, showing good feathering, with abundant down lying close to the head, and eyes, full and expressive; heavy curved beak; chickens that are upright, lively and peart. In Fig. 5 B are three chickens of the same age, with dropping wings. The wings of the weak chicks are not as large as those of the stronger chicks, but they look larger at first because the body of the weak chickens are so small. The bodies failed to grow. The attitude of the chicken indicates quite accurately its vitality. Here in Fig. 6 you will find four chickens of the same age, Rhode Island Reds, all hatched in the same incubator, brooded in the same brooder, fed on the same rations, and yet the largest chicken will weigh at least five times as much as the smallest chicken and will weigh perhaps a third more than the other two.

It is purely of inheritance or acquired weakness or both. These chickens marked A were born strong; the ones marked B were either born lacking vitality or acquired the weakness. They never can wholly overcome it. Sometimes they overcome it in a measure, but as a rule they are never chickens that could be kept on a farm beyond the broiler age with any degree of profit. The thing to do always in breeding up our stock is to select rigidly up to the time that we mate up our breeding pens, then select the eggs the right size and shape and with good strong shells, then select the strong germs. We have run experiments by which we could compare the strength of the germs every seven days and picked out those that were large and strong and vigorous and those that had low heart beats and small development. We carried them through to the hatching time and found a wonderful difference in the hatching power and strength of the chickens determined entirely two weeks before they were hatched just by the way the embryo developed. Whenever we see a low vitality chick at hatching time the thing to do is to kill it and at any time when they look listless at any age, dispose of them. After they reach an age of several weeks, frequently we can mark the weak ones with red paint and keep them until they are about one pound or more in weight and then sell them to make sure they do not get mixed up with the balance of the flock.

Here in Fig. 7 is the evidence of what can be accomplished by mere selection. There is a flock of pullets marked strong that were hatched from a flock of hens that had been selected for their strong vitality from a common lot. Here are pullets marked weak that are of the same age as these marked strong. They were hatched from eggs laid by hens that were of less vigorous vitality. Now the mothers of both of these flocks of pullets had all run together all summer long in the corn field and were simply picked out in November. The stronger ones were put in a pen and the weaker were put in another pen and the record kept of egg production, food consumed and hatching power, etc. The following fall, at the time this picture was taken, these pullets from the high vitality parents were laying; these from low vitality parents did not begin to lay for five to six weeks after the others; the former weighed half a pound apiece more at the time they were five months old than did the latter. That is a pretty big difference for Leghorns that would ordinarily weigh only 2½ to 3½ pounds apiece, due purely to a question of inheritance—they apparently inherited their vitality from the parents. They were better layers. The records showed that these pullets of high vitality, like their mothers, laid eleven and a fraction more eggs each year in the case of the mothers and between twelve and thirteen eggs per hen more in the case of the pullets than those of low vitality.

Knowing the audience that is before me, teachers who must know the truth, I know you will excuse me for discussing a question that, in some audiences, might be considered inappropriate or indelicate, I do not know of any way to impress the truth except by telling it. One of the most important problems that we, as poultrymen, have confronting us is the problem of getting fertility and hatching power in the eggs, particularly layers, in early spring. We all recognize the fact that there is a big difference in this respect between individuals. I think, as a rule, farmers are likely to pick out the best males as regards vitality if they make any selection at all unless they get blinded by the color as some do; they usually pick the biggest and most active ones. I think that as a general rule is a good rule. It is well that we have other matters under consideration at the same time. In order to know what the difference is between the active mating powers of the birds of high, medium and low vitality, we conducted some experiments this last Spring. We are continuing these experiments at the present time at the college. Birds of high, medium and low vitality are marked with different colored paints and then some person stays in the pen from morning until night, making accurate observations of the mating qualities of these birds with the same large flock of fowls in each instance.

Here (Fig. 8 A) is a picture of five males that were picked for their high vitality. Here (Fig. 8 B) are five picked for their medium vitality and here (Fig. 8 C) are five for their low vitality. These males had all been used in some sort of breeding experiments at the college and up to the time the observations were made they had all been running together at the close of the breeding season last Spring in one large flock out in a place that we had built especially for their accommodation in the summer. One of our students, with the aid of one of our instructors, went into that large flock of males and picked out these individuals because of vitality, their size, their activity, their evident gallantry, ther sprightliness and those general characters that I have already described in the first slides shown in the lecture. They picked those marked low because they lacked in vitality qualities. They may have been just as large or they may have been larger in size, but they did not show those other characters that were necessary to get the right quality of vigor, and these marked medium were just about half way between the best and the poorest.

You will notice that this picture (Fig. 8 A) appears to be blurred. Though we took several pictures—we found it impossible to get one of that bunch of five without finding some or all of them scrapping. This picture shows that one fellow is spoiling for a fight, and this one is getting ready to declare war on that one and the other is not neutral by any means. Like the five nations of Europe, now at war, they are all at it, every last one of them. Among the low vitality you don't notice any evidence of scrapping. They are all looking

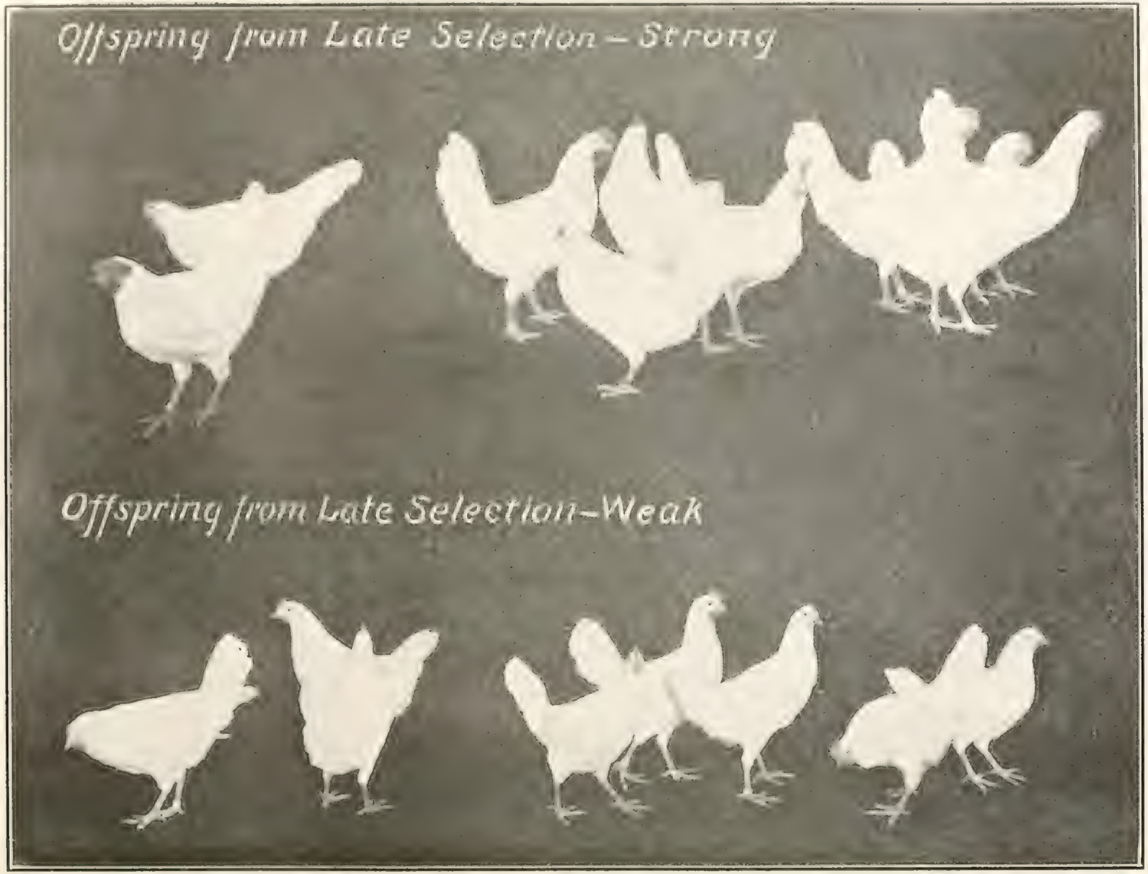

Offspring from Late Selection – Strong
Offspring from Late Selection–Weak

Fig. 7. High and low vitality groups of White Leghorn pullets indicating the way in which physical characters are transmitted from parent to offspring. The strong vitality group were from high vitality hens. The weak vitality group from low vitality hens.

Figs. 8 A, 8 B, and 8 C. Three flocks of cockerels selected according to their physical vigor. Note the characteristic poses and actions indicating physical vigor or weakness.

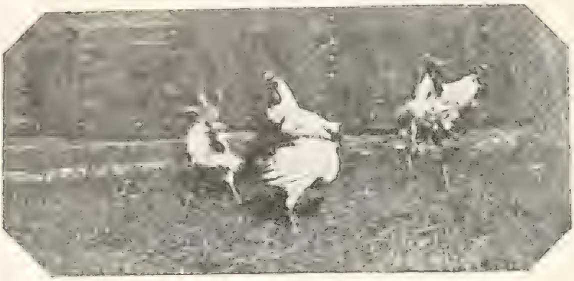


Fig. 8A. Birds of high constitutional vigor.

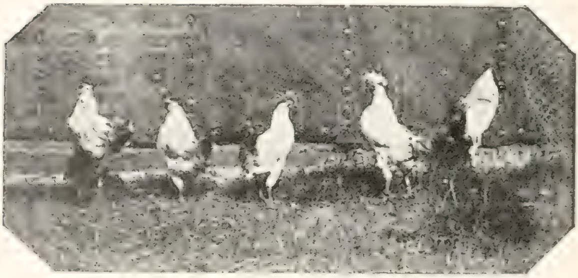


Fig. 8B. Birds of medium constitutional vigor.

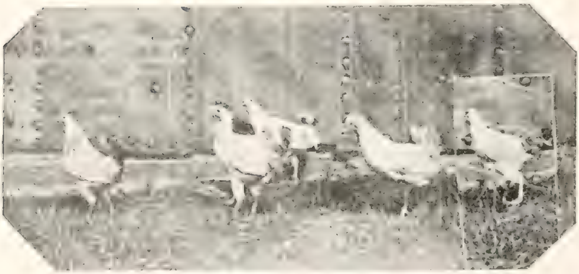


Fig. 8 C. Birds of low constitutional vigor.

around to see if anything is coming to get them; every one of them is on the lookout to "get out of it." The strong birds are on the lookout to "get into it;" that is just the difference between the two lots. The high vitality want to get into the scrap, and the low vitality want to get out of the scrap, and medium vitality are about halfway between. Here are the actual results of the mating observations. These lines here shown in Fig. 9 represent efficiency in mating of the individuals in all the different times that they were compared. The largest lines represent the number of matings of males of high, medium and low vitality, so you will see how these different tests resulted. The figures are the results of the 1st, 2nd and 3rd tests with the same individuals. Here are the males of medium vitality, 1st, 2nd and 3rd tests. Here are the birds of low vitality, 1st, 2nd and 3rd tests. When you come to add all these three together in each of the three groups, we get these lines at the lower part of the illustration and we find that during those hours of observation on those particular days, there were 132 matings of these five individuals of high vitality, 61 of these of medium vitality, and 39 of these of low vitality. The question for us to settle is whether it pays to spend a little time in daily observation of the individual characteristics of our males before we undertake to let the result of an entire seasons' hatching go by with infertile eggs and inefficient matings just because we have not taken the time to find out whether the males were strong or weak.

Another factor of importance is to know how hens differ in fertility and hatching power.

A COMPARISON OF THE FERTILITY AND HATCHING POWER WITH THE EGGS PRODUCED PER HEN.

Eggs Laid in Two Years of Production.	Number hens.	Eggs incubated.	Per cent. fertile.	Per cent. chicks to eggs set.
175 or less,	5	58	100	69.0
176-225,	11	194	90.8	56.7
226-275,	27	427	94.0	63.2
276-325,	19	291	95.5	66.0
326-375,	16	241	95.4	58.6
376 and over,	4	64	82.8	42.2
Summary,	82	1,275	93.0	61.2

Table I. The way in which hens of widely different laying records differ in fertility and hatching quality of theiir eggs.

Table I shows the actual results of the carefully kept records of a year with birds in the college flocks. Here we find, all told, 82 hens under consideration that laid 1,278 eggs that were carefully tested. They averaged 93% fertile and 61% of these hatched. These hens are grouped into these different collections, those that laid in two years' time 175 or less eggs—that is pretty low production: 176 to 225, then 226 to 275. You see we increased about 50 eggs at a time or 25 eggs per year per hen is the difference in the grades here used. The number of hens in each one of these groups is shown and the number of eggs used in each one; also the percentage of fertile eggs in each group, and the percentage of chickens hatched in each group. Notice that we get our best results ordinarily (with just one bare exception) in the percentage of fertile eggs that are laid by birds that are of medium to high production rather than with the birds that are either excessively high or excessively low producers. It would appear, therefore, from these data and other observations, that birds of low vitality do not give us good fertility or good hatching power because they are likely to be weak physically during the breeding season. It would appear that birds of exceptionally high egg yield failed to give us good fertility and hatching power because they have weakened themselves by heavy laying. In one case we did not get our good results because we had good hens that outdid themselves, and in the other instance because we had poor hens that were physically weak.

The next few slides will deal with some remarkable hens that have been discoverd rather than produced, as a result of our trap-nest experiments. I hope to make the point clear, that in discussing these very high producing birds, that you should not give us any particular credit for it except as regards proper care, because, in my humble judgment, there are thousands of birds in this country exactly as good as the ones here shown, only they have never been discovered. They are in the flocks and doing the work; but it needs the trap nest to bring them to the surface. There is a little hen (Fig. 10) that laid 257 eggs weighing 29 pounds. She ate practically 110 pounds of feed and gave us 72 pounds of voidings and laid in one year's time, over five dollars worth of eggs at market prices. That bird (Lady Cornell) is one that ought to be perpetuated. These three birds are the most valuable fowls that we have discovered in the flocks. They are on their sixth year record. Some of these died in their fifth year; but we have others of the same general group that are still with us. This bird (Cornell Supreme), the best one of the lot, laid 665 eggs in three years' time and laid 225 eggs in her third year. These birds that died, apparently did so not because of any physical breakdown, so far as we could see. Cornell Supreme laid an egg the day she died. She suffocated during an exceptionally hot spell on a very sultry day two years ago, apparently when in the very best of health. Look carefully at the type of those three high producing birds. They are alike. I don't believe that it is possible to absolutely pick out an egg type fowl and say that this bird is or is not purely on account of its *shape* a high producer. I am a firm believer in certain physical characters, as indicating production. At the same time there is something inborn in the bird that does not always necessarily show in shape, that determines her high producing power.

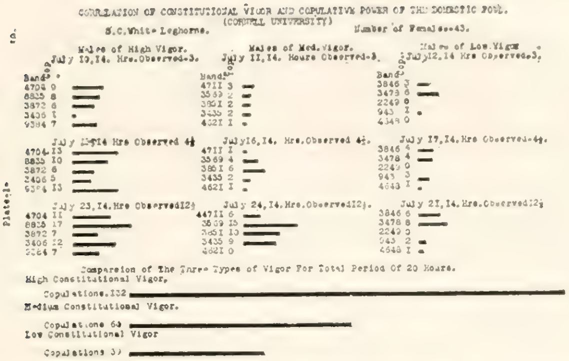


Fig. 9. Note the difference in the length of the lines which indicate the relative mating power of the three flocks of males shown in Fig. 8.

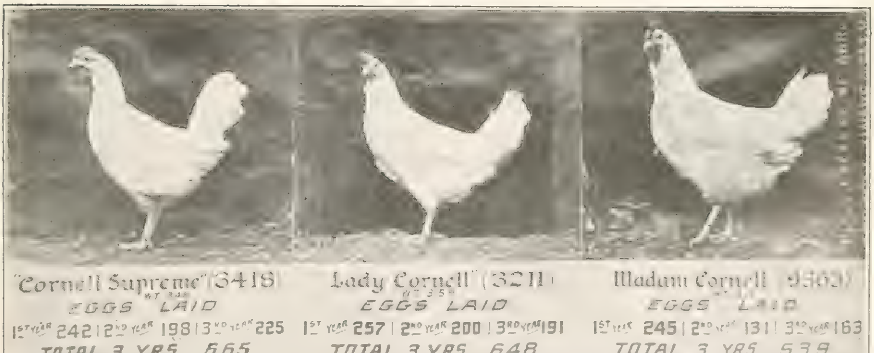


Fig. 10. The three highest producing fowls discovered among the flocks at Cornell University. Observe the differences.

YEARLY RECORDS FROM DATE FIRST EGG WAS LAID OF SOME OF THE HIGH PRODUCING HENS AT CORNELL UNIVERSITY

Date hen laid first egg.	Hen number.	Name.	Eggs laid first year.	Eggs laid second year.	Eggs laid third year.	Eggs laid fourth year.	Total four year record.
Dec. 6, 1909	3,211	"Lady Cornell,"	258	200	191	123	†772
Nov. 24, 1909	9,363	"Madam Cornell,"	245	131	163	83	†622
Nov. 20, 1910	5,697	"Cornell Prolific,"	243	162	146	119	670
Dec. 8, 1910	5,626	"Cornell Laywell," ..	205	165	159	124	653
Dec. 10, 1909	3,418	"Cornell Supreme,"..	242	198	225	124	*789
Dec. 4, 1908	1,463	"Cornell Suprise," ...	180	186	196	....	‡562
Dec. 8, 1911	8,686	"Cornell Persistent,"	192	197	178	....	§567

*Fourth year incomplete. Died July 3, 1913.
†Four years complete. Died in fifth year.
‡Three years complete. Died fourth year.
§Three-year record.

Table II. A list of the first, second, third and fourth year records of seven high producing hens at Cornell University.

We now come to the question of breeding our birds with regard to discovering their ability to live long and produce well,—which may be called their longevity. Here are the records of a good sized group of birds that have now completed, in this instance, their four year records, but we have their fifth, in which, it is seen that this particular bird laid 772 eggs in the four years' time, laying 258 eggs the first year, 200 the second, 191 the third and 123 in the fourth year. The best bird in the lot, laid 242 the first year, 198 the second, 225 the third and 124 in the fourth, or a total of 789 eggs in the four years' time. Here is a bird that is exceedingly surprising and she was named Cornell's Surprise on that account because she laid 180 eggs the first year, 186 the second and 196 the third, increasing her production each year. This bird we still have with us and we are hoping for great things because of her persistency in production, laying such a high average each year, 192 the first, 178 the third, or a total of 567 eggs in the three years' time.

A Member: I note all these hens began to lay very late in the Fall. Do you intend that that should be so?

PROF. RICE: No sir. Ordinarily it would not have been true, but the birds were hatched late and therefore began to lay late. If these birds had been hatched early they unquestionably would have begun early to medium early in the Fall to lay.

A Member: How late?

PROF. RICE: Frequently when they are around five or six months old. Some of our high producing birds, however, do not begin to lay until they are six or seven or eight months old. The birds that do not begin to lay until they are nine or ten months old, almost always are medium to low producers. In order that we may find out how important that is, we keep our best birds for a period of several years. We are going to call attention to some of these distribution records of hens whose records are known for three years, to show how easy it is for a person to kill the best hens he has on his farm and never be any the wiser unless he knows their individual records.

DISTRIBUTION OF EGG PRODUCTION BY ONE YEAR PERIODS AS AN INDICATION OF PROLIFICACY. THREE CALENDAR YEAR RECORDS OF 169 S. C. WHITE LEGHORN HENS AT CORNELL UNIVERSITY.

Groups.	Number of hens.	Per cent. of total.	Average production, first year.	Average production, second year.	Average production, third year.	Total average production, three years.	Three-year rating of groups.
I,	80	47.34	158.68	127.60	102.91	389.19	3
II,	8	4.73	91.00	107.86	115.25	314.13	8
III,	21	12.43	149.86	111.95	120.38	382.19	4
IV,	21	12.43	95.48	134.29	119.52	349.29	7
V,	21	12.43	119.05	133.90	99.38	352.33	6
VI,	11	6.51	130.45	121.27	138.09	389.82	2
VII,	1	.59	86.00	54.00	54.00	194.00	10
VIII,	2	1.18	100.00	129.50	129.50	259.00	5
IX,	2	1.01	58.50	58.50	63.50	180.50	11
X,	1	.59	147.00	147.00	132.00	426.00	1
XI,	1	.59	80.00	72.00	80.00	232.00	9
Total for all groups,	169	100.00	136.92	124.48	109.18	370.57	....

Table III. Tables showing the distribution of egg production for three years in groups to show when they made their largest, medium and lowest production.

These are the records, shown in the case of 169 hens that lived for three years and were trap-nested. This does not take into consideration any of the hens that died i nthat time; it means all the hens that lived for that length of time that were in this experiment. We grouped these according to whether they laid the most eggs the first year, the second year or the third year. You see if we have the three year records of 169 hens, they must have laid the most or the least or the medium production of eggs the first year or the second or third year or else they must have laid the same number two or more years, hence we have grouped them up that way and we find that out of the 169 hens 47% or 80 out of the lot laid the most the first year, less the second and least the third; that the order of the production was highest in the first year and then a declining scale for the other two years and they laid 389 eggs in the three years time and stood third in the list of groups. The next group reversed the order. There were only 4.79% but their order was the least the first year, more the second and most the third, but laying all told only 314 eggs in the three years time. They were poor producers even though they increased each year for three years never laying an average of more than 15 eggs in any year. Then we had a group of 12 and a fraction per cent. that laid most the first, least the second and came up in the third and laid 382 eggs in three years, only 7 less than the group we first considered. Then we had a group of 21 birds that made the poorest record the first year, best the second and medium the third, 349 eggs, and they stood seventh. We then had a group of 12% that laid the minimum the first, the most the second and the least the third. They laid 352 eggs. Then we had a combination that laid medium the first, least the second and most the third; they laid 389 eggs and stood second in the combination. Finally the highest group record in three years' time was by an individual that was a consistently high layer and laid the same number the first and second years and laid in three years' time 426 eggs. The poorest one of the lot laid 232 eggs in three years only about 78 eggs a year. The point that should be emphasized is, that one can never know absolutely, the best hens in his flock unless he knows their records for at least two or three years, for sometimes they come up surprisingly in the second and third years and very frequently the birds that make the best records the first year, that is a very high or abnormal record, will be the birds that lay less eggs in their next year and rest, and come up again and lay more eggs in the third year than in the second.

A Member: Does your experiment only apply to Leghorns or all types?

PROF. RICE: I think it would apply to most breeds of Leghorn type. I do not believe it would apply in the same way with the heavier breeds; I think there would be a tendency perhaps for some of the heavier breeds to lessen in their production a little more rapidly as they grow older and yet that is only a guess.

A Member: Were these birds all treated the same in feeding and otherwise?

PROF. RICE: Oh, yes. They were all kept on the same farm, fed by the same man and had the same kind of rations. It is very fortunate that we have not varied our rations at the college in our experiments with birds for the past 7 or 8 years.

The next factor we want to consider is the question not merely of the eggs that hens lay over a period of years, but it is the eggs that they lay during various months of the year. What we want to know is the dollar's worth of eggs that hens lay. We not only want a hen to lay many eggs but to lay just as many as possible when they are high in price. One egg in the fall is worth three or four eggs in the spring. It is exceedingly important that we get a hen that distributes her production properly. We want October, November and December layers, and, therefore, that factor ought to be taken into consideration always in selecting our birds. They lay more dollars worth of eggs then with only fair production than the others even though they may not lay as many eggs in a year as hens that do not lay well in the fall. Generally, however, we have this in favor of the fall layers as pullets or hens that our records show that almost invariably the birds that lay the most eggs in the months of September, October, November and December, whether they are hens or pullets, are the birds that have also laid the most eggs in the year. The birds that only lay in the spring never lay eggs frequently enough to make up for the lost time in the fall and winter. The supreme test of the high producing quality of a bird is the number of the eggs she lays when the conditions are most unfavorable. This statement I am well aware is contrary to the opinions of some practical poultrymen and investigators, but I am perfectly willing to assume the responsibility for its accuracy.

Now just get this point. Never undertake to pick out high producing hens when the conditions are favorable for production. At this time all or nearly all the hens both good and poor are laying. When climatic conditions are against them the good ones only continue to lay.

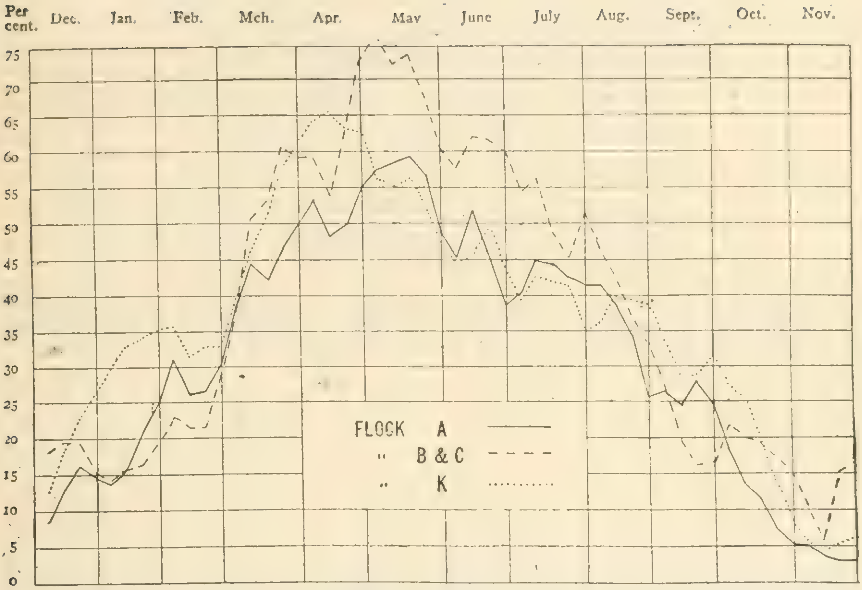
A Member: Do you advise to feed these hens all they wish to eat when they are under this test?

PROF. RICE: Yes sir, all that they wish to eat of the right kind of dry mash feed, but not all the grain they want to eat. So long as they have all they can eat of dry ground feed, with its meat, bran, middlings, cornmeal, etc., fine ground dry feed and possibly a wet mash a day; and so long as they eat it up clean, there is little or no danger of overfeeding. The danger of overfeeding any flock of fowls is when they can eat all the grain, whole or cracked that they want without working for it. They are likely to fill up on it and become lazy and inactive, and lacking the physical activity or the keenness of appetite to exercise they become less productive.

A Member: Would it make any difference if they had a little feed left in the evening?

PROF. RICE: Not at all, so long as they cleaned it up promptly the next morning. I think the idea especially in the winter of letting them have a little grain left over at night, so long as their appetites are kept keen, is a good one.

We ought to study the normal curves of production at different months. This slide (Fig. 11) represents the monthly percentage of production for a year, of three separate flocks of fowls in different parts of New York State, several hundred fowls were in each flock. The records were kept by men who knew nothing about what the other co-operators were doing and yet when these records were sent in every month and tabulated and plotted up at the end of the year, we find with what great uniformity these three flocks of fowls produced their eggs. Beginning over here in December we find that in all three instances their production was less than 20%. In some instances it was as low as 12% to 15%; that in the month of January it came to about 20% and 25% or in one case as high as 35%. In February they all came up a little; one dropped a little temporarily; then in March they all gave a big jump to 45% or better. In April it was up to 50% to 65%; in May one flock went as high as 75% and the others dropped a little; then came up slightly; in June they began to go down; then lower in July, lower



The percentage egg-production for each month of the year varies with great regularity one year with another, always being lowest during October, November and December, and highest during April, May and June. Observe the wonderful regularity in egg-production of three flocks as shown above

Fig. 11. Plotted curve showing percentage production of three flocks of fowls in various parts of New York State. Observe the comparative uniformity in production of each of the flocks for the various months of the year.

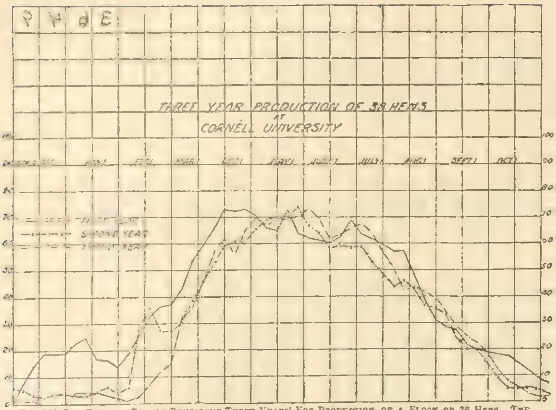


FIG. 100. THE PLOTTED CURVES REPRESENT THREE YEARS' EGG PRODUCTION OF A FLOCK OF 38 HENS. THE HORIZONTAL LINES REPRESENT THE PERCENTAGE OF EGG PRODUCTION EACH MONTH.

Fig. 12. Plotted curve showing the yearly production of 38 hens for each month of the year for three years. Observe the higher production the first year during the fall and early winter months as compared to the same fowls in later years.

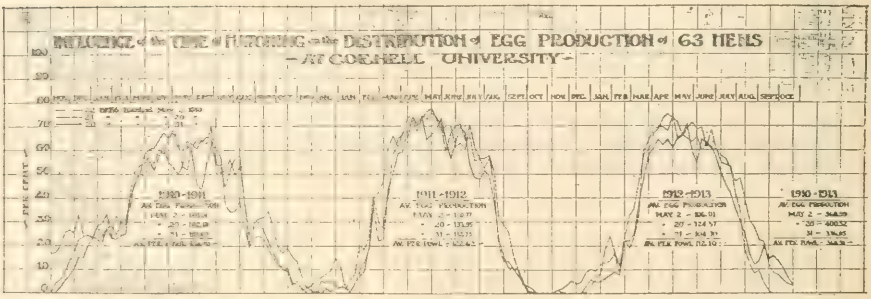


Fig. 13. Three years production of three flocks of fowls hatched at different times in the spring as indicating the effect of time of hatching on egg yield.

in August, lower in September, lower in October, and reached their lowest point in all instances as low as 5% to 7% production per hen per day. We find that with mixed flocks of old and young Leghorns, as these were, farm flocks, that we can calculate with a good deal of accuracy about how the curve of production is likely to flow, in any year with any flock under normal conditions. This particular man who had the fowls represented by these dotted lines, had almost all pullets. The other two flocks contained a larger percentage of hens. One can count very readily on the higher percentage of production in those months with the pullet flock than you can with the older hens.

We are going to come to a little more detailed study of records of trap-nested hens at the college. Here are the records (Fig. 12) of 38 hens for three years. The solid line representing the first year, the dash and the cross line representing the second year, and the dash and dot line representing the third year of production of the same hens shows how the 38 hens laid each month of the year for three years. One record super-imposed directly over the other, will therefore show how they vary according to their ages in production. You will notice that the first year their record was 10% or 12% in November, that it was about 20% to 25% in December; that it dropped in January, came up perceptibly in February and up higher in March and still higher in April, and dropped a little in May, but sustained a pretty high egg yield clear through June into July, then began to go down gradually in August and September, and landed a little higher in the following fall than any of the others, so that you can see that in the first year, pullets, if they are hatched early so that they can begin properly to lay early in the fall, will lay much heavier percentages of production in October, November, December and January, when prices are high, than they will ever do after that; that they will also continue a high production the first year, all the way through, and lay a higher production in the following fall than do the hens in later years if all the birds are taken into consideration on which to base flock averages. In the second year they are slower to begin to lay in the fall. In third year, they are still slower to begin to lay in the fall. They all come up to about the same place, regardless of their age, during April, May and June. They all begin to go down just about the same way during July, August and September, but they quit a little earlier in the fall in the case of the older birds. Do you see the point? The tendency is to shorten up the production in those months of unfavorable laying conditions.

We have plotted curves of production shown in (Fig. 13) of each of three flocks of fowls, namely: 22 hens, that were hatched May 2nd; 21 that were hatched May 20th, and 20 that were hatched May 31st, to see how the time of hatching affects the production of the birds, not only the first year but the second and third year. Do you all thoroughly see the point? It is one of the most important factors in the successful commercial handling of birds, to get the pullets hatched at the right time of the year. We can hatch pullets too early or we can hatch them too late, depending upon the breed, the season and the location in which we happen to be living. If we hatch our pullets too early, they mature and begin to lay too early in the summer, in hot weather. They then go through a moult and are caught by the cold weather of the fall with their overcoats off, so to speak, and then they do not lay well during the early winter. If on the other hand they are hatched too late, they then are not fully plumed when the cold weather comes and as a result they, too suffer from the cold and do not lay well. The ideal conditions in New York State with Leghorns is to hatch the birds so that they will be ready to lay just before cold weather comes. The exact time that is best will vary a little one year with another. One cannot tell in advance, but we find that hatching in May—never as late as June, if we can help it, and never as early as March, but somewhere during April and May, and probably the very best about the first of May, in the long run gives us our best results, and yet when we come to consider the record of these three flocks of birds all reared the same way, hatched from the same kind of stock and given the same kind of care, the 22 hens hatched May 2nd, the 21 hatched May 20th, only three weeks later, and the 20 hatched on the 31st, which is only 11 days later—we find considerable difference in their production.

Now let us notice that, of the first hatch, they laid 140 eggs; the second hatch laid 142 and the third hatch laid 118 eggs the first year; the second year, the first flock laid 120 eggs, the second laid 133, the third laid 112. The third year the first flock laid 106 eggs, the second laid 124, the third flock laid 104; so that those birds that were hatched the 31st day of May, practically the first day of June, apparently were hatched just a little too late to get ready to lay when the early fall cold weather struck them, and they did not get under motion early enough in the fall and they never got over the handicap. All the way through the three years' time they were the last in the race. Now taking the 3 years' production as represented by all these plotted curves for each month of the three years, we find that the birds that were hatched on May 2nd, laid 363 eggs; those that were hatched May 20th, laid 400 eggs; those that were hatched May 31st, laid 336 eggs. If you will study the curves, you will see that point brought out clearly, namely: That as the hens get older, they lay just about the same number of eggs, same height of production in the months of April and May. Now notice that this curve of percentage of production is higher in the second and third years, even during April and May, than it was in the first. Why is that? Simply because in the first year they laid so heavily in these early fall months that it reduced their production a little in the early summer; whereas in the second year and the third year, they began later and later to begin to lay in the fall; consequently, when they began to lay, they gave a heavy production in those two particularly favorable months of April and May. When you come to plot the fourth and fifth years, as we are doing at the College, we find that they still maintain high yields in April and May; but they begin later and later to lay in the fall and quit earlier and earlier the following summer. I predict that when we keep those birds, as we hope to do, as long as they live, we will find that they will only lay eggs eventually, if they lay at all, in the months of April and May, the most favorable season of the year.

There in Fig. 14 is a study that gives us the actual daily egg production of each one of those bird that we saw represented in the previous illustrations. The first year's production of every one of those birds is shown in colors. Let us understand what this key represents. The first year's production for each month, beginning with November first until the following November, each block represents the days a fowl lays; a vacant space represents the time she did not lay. We have arranged these birds into three groups; the upper group was hatched May 2nd; the middle were hatched May 20th; the lowest were hatched May 31st. Each group you see was a different brood. Then each one of these groups are arranged according to time each one of the pullets in the group to the left began to lay. To the left are the leg band numbers of each fowl.

When we started the records in November, four birds were laying. How many eggs they had laid before we caught them in the trap-nest, I don't know, but I think you can get a pretty accurate idea when you study these records of production below, because you see these four had begun to lay when we started, this one laid next day, this one next and this one three days later, and so on until we find one hen that did not begin to lay until way over here the last of April. Notice the second hatch. The first hen began to lay a week after we started the records; the next one a week later, the next two or three days later, and so on, until the last one in that hatch began to lay the last of March. Then here is the third hatch—the first one began to lay two weeks after we started the record, and the last one began to lay way over here the last of April, but notice the point that they began, as a group, to lay just about the same time as the difference in the time of their hatching, i. e. each of the groups when we consider them in mass usually are two to three weeks late in production. Now you will say, I would like to know what those birds are going to do the following fall? If these birds, hatched a little later in the spring, began to lay later in the fall they must lay later the following fall. Let us see whether they did or not. Follow these lines and you will find these birds that were hatched first began to lay first, and were still laying the last day, absolutely the last day of October of the following year. How about the second hatch? Well there were three or four still laying at the time the year closed. How about the last hatch? Just about the same. In other words, here is what happens, as the next picture will show. (Fig. 15). When the cold fall weather strikes the hens they all respond in essentially the same way regardless of the time they were hatched the previous spring. That is exactly what these birds did, all stopped essentially at the same time, almost regardless of what time they began to lay. They did lay a little more heavily in the spring if they started a little later in the fall. You will notice in the first group there are more vacant places, representing the days the hens did not lay, scattered around in March, April and May because they had laid so heavily in the early fall. The later hatched pullets never caught up in their production. The second year (Fig. 15) these birds that were hatched late did not get down to business any earlier than the others. When you come to the third year, you will find that they did not continue any later. The point is that if birds are not hatched early enough to begin business early in October and November, they never get over it, never catch up the lost time. Here is the third year (Fig. 16), the same birds, and you will notice that each year there is less and less production in the fall of all three groups, but they hold to their heavy production in these early months, as shown by the previous slide.

Before we can make very much progress in breeding for egg production, we must decide on the meaning of some terms. I have taken occasion a good many times to talk with people about their ideas as to what constitutes good egg production. A man will say, "Oh I think a hundred egg hen, or a hen that is laying 125 eggs per year is doing pretty well." Another man will say, "A hen is no good unless she can lay 150 eggs or 200 eggs." If we are to decide what is a high egg yield, we must decide whether we mean the first, second or third year records or the total one, or three year production, so I took a test one day of 13 persons who had a good deal of experience in the poultry business and asked them to give an estimate of what they considered an egg yield should be to fit the following terms, phenomenally low, exceptionally low, very low, fair, medium, high, very high, exceptionally high, phenomenally high. There are some good terms to express yields of what would be considered a good flock of birds given good care on a poultry farm. What would they be expected to do to fit these terms? Here is the result based on the average of all replies:

A SYMPOSIUM OF GUESSES AS TO A GOOD AVERAGE FLOCK EGG PRODUCTION PER HEN PER YEAR TO FIT DESCRIPTIVE TERMS INDICATING VARIOUS GRADES OF PRODUCTION.

	1	2	3	4	5	6	7	8	9	10	11	12	13	Total	Av.
Phenomenally low,	50	25	25	25	20	30	20	20	40	25	70	20	50	420	32.3
Exceptionally low,	60	50	60	40	40	40	30	40	60	40	75	30	60	625	48.
Very low,	70	75	80	50	60	50	40	60	75	60	80	40	75	815	62.7
Low,	100	100	100	95	80	70	50	80	90	80	90	60	100	1095	84.2
Fair,	125	115	125	115	100	85	60	95	110	105	100	100	115	1350	103.8
Medium,	150	125	150	125	120	100	75	110	125	125	110	115	125	1555	119.6
Good,	175	135	165	135	140	130	100	125	140	130	125	150	140	1790	137.7
High,	200	150	180	150	160	160	125	145	160	140	140	180	150	2040	156.9
Very high,	230	175	200	160	180	180	160	165	180	160	150	200	160	2300	176.9
Exceptionally high,	250	200	225	180	200	190	200	180	200	170	155	215	175	2540	195.4
Phenomenally high,	275	225	240	200	220	200	225	200	225	180	160	230	200	2780	213.8
Totals,	1685	1375	1550	1275	1320	1235	1085	1220	1405	1215	1255	1340	1350	17310	

Table IV. A table giving the result of estimates of the egg yield that would fit descriptive terms to indicate the productive power of fowls.

Phenomenally low, 32; exceptionally low, 48; very low, 62; low, 84; fair, 103; medium, 119; good, 137; high, 156; very high, 176; exceptionally high, 195; phenomenally high, 213. For a flock of 100 birds laying 213 eggs per hen per year I think if you search the United States from one end to the other you would not find them. You can see by these figures what some poultrymen of the country think about what constitutes high, medium, low or average production.

Our next problem is to try to find out how to pick out the high producing birds without the use of trap-nests, or perhaps, if we have trap-nests, when it will pay us best to use them. I should say that the first principle in selecting birds for egg production aside from their constitutional vigor would be to begin with their fall records as pullets, with this principle in mind, that an individual is likely to show early in life those characters that are likely to dominate it throughout life. We find that when our pullets are put to this test that if they are hatched at the same time early in the spring, say in April or May, and we know their ages so that chickens of the same age can be compared, if with good care they do not lay before they are 8 months old, we are pretty sure that they are not going to be high producing birds if we should keep them for a period of years. Once in a while we find an exception to this rule, but rarely, so that the earliness with which a pullet begins to lay—and by earliness I mean their *age* and not alone the time of the year that they began hatching.

EARLY EGG PRODUCTION AS AN INDICATION OF PROLIFICACY. THREE CALENDAR YEAR RECORDS OF 169 S. C. WHITE LEGHORNS AT CORNELL UNIVERSITY.

Group According to Age First Egg was Laid.	Number of hens.	Per cent. of total.	Average age when first egg was laid.	Average production first year.	Average production second year.	Average production third year.	Average total production for first three years.
151-180,	4	2.37	176.25	173.25	135.75	126.50	435.50
181-210,	71	42.01	199.77	157.01	133.63	116.41	407.05
211-240,	52	30.77	222.46	140.10	121.37	106.19	367.66
151-240,	127	75.15	208.32	150.60	128.67	112.54	391.81
241-270,	22	13.02	255.50	108.10	121.05	108.50	337.65
271-300,	11	6.51	285.09	93.91	93.56	84.27	271.74
301-330,	6	3.55	315.50	88.33	129.00	107.67	325.00
331-360,	1	.59	359.00	45.00	75.00	69.00	189.00
476,	1	.59	476.00	27.00	155.00	126.00	308.00
1,100,	1	.59	1,110.00	....	....	3.00	3.00
241-1,110,	42	24.85	299.88	95.55	111.81	99.00	306.36
Total,	169	100.00	231.08	136.92	124.48	109.18	370.57

Table V. Table giving the egg yield for three years of 169 fowls in groups according to the age at which they laid their first egg.

The age at which pullets lay their first eggs is a very safe guide in making our first selection for high producers. Here is the result of actual trap-nest records of 169 hens. This table is so arranged that we find over here to the left the groups according to age in days when they laid their first egg. The first group laid when they were 151 to 180 days old, and each of the other groups are 30 days older; for example, 181 to 210 days, 211 to 240 days, or just a month older for each group. You can easily remember how one group differs from the other by 30 days. There were 4 in the first group, 71 in the second, 52 in the third group, and so on, and when the three first groups are assembled they averaged to lay when they were 151 to 240 days or 8 months old, and include 127 birds out of 169. Now the balance of them, the other 42, laid when they were 241 to 270 days old; and so on down to the smaller birds in the groups. The next column shows the average age when the first egg was laid, 176 days, 199 days, 222 days; or an average of 208 days old for that group of 75% of the birds. Do you get the point, that out of 169 birds, 75% of them, ¾ of the birds, had begun to lay when they were an average of 208 days old. Now the average production for these birds the earliest to begin to lay for the first year, for the second year, for the third year and for the three years combined, is as follows: The first group, 173 eggs the first year, 135 the second year, 126 the third year, or a total of 434 eggs in three years. Those that began a month later, laid in the order of 157 eggs the first year, 133 eggs the second year, 116 eggs the third year, a total of 407. Those that began a month later, that is, two months later than the first group, laid 140, 121, 106 eggs per year respectively, a total of 367 eggs. Now the 75% of these birds averaged to lay 150, 128, 112 per year, or a total of 391 eggs in three years. Let us take all these birds that did not begin to lay until after that age, the older groups, and you see what a sudden dropping off in production there is of that group, that did not begin to lay until they were an average of 255 days old; they laid in the order of 108, 121 and 108 eggs. Those that were in this later group, laid a month later; 93 the first year, 94 the second year and 93 the third year, and so on down. We have an average total of 370 eggs for the early producers as against 306 for the late. In other words, we find that the birds that laid by the time they were 8 months old, as a rule, are likely to be high producers, whereas those that do not lay until after that time are likely to be low producers.

THE INTENSITY OF EGG PRODUCTION AS AN INDICATION OF PROLIFICACY.*

Leg Band No.	1st Year.		2nd Year.		3rd Year.		Total eggs laid in 3 years.
	No. days continuous laying.	No. eggs laid.	No. days continuous laying.	No. eggs laid.	No. days continuous laying.	No. eggs laid.	
5697,	15	243	5	162	6	146	551
7518,	5	221	8	163	4	109	493
7580,	5	151	28	145	12	159	459
5675,	3	148	5	136	6	155	439
7700,	3	152	5	135	6	141	428
5708,	5	151	12	142	12	133	426
7675,	6	140	7	149	9	131	420
5633,	4	159	4	114	3	133	406
7597,	5	137	11	424	6	139	400
7455,	8	138	9	107	13	105	350
7169,	8	118	11	104	6	124	346
7668,	6	106	21	101	12	114	321
7869,	7	106	7	72	6	58	236
7504,	6	83	8	86	6	57	226
7658,	2	45	2	53	2	65	163

*Fifteen Single Comb White Leghorns at Cornell University selected from sixty-three whose Records are known for three years or more.

NO ILLUSTRATION FURNISHED

Fig. 14. Daily distribution of egg production of 63 fowls to show the way in which the time of hatching affects the time of laying.

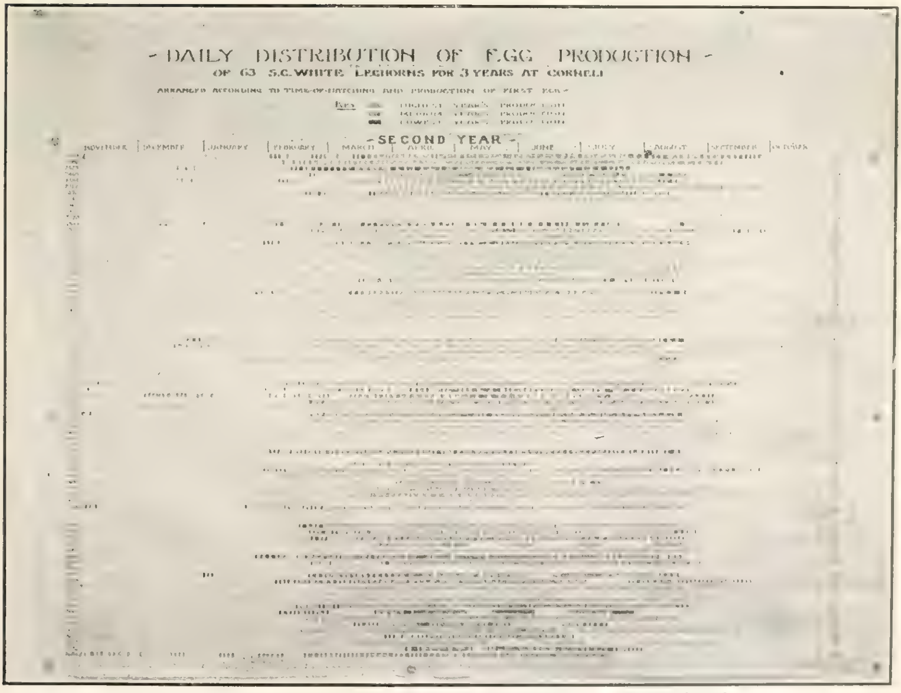


Fig. 15. Second year of daily distribution of egg production.

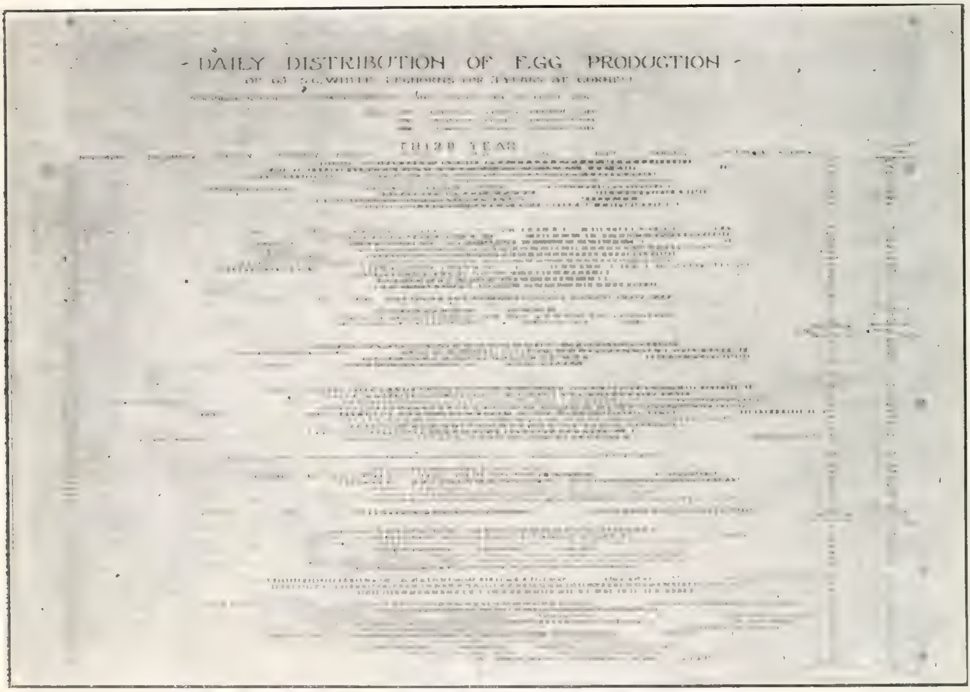


Fig. 16. Third year of daily distribution of egg production.

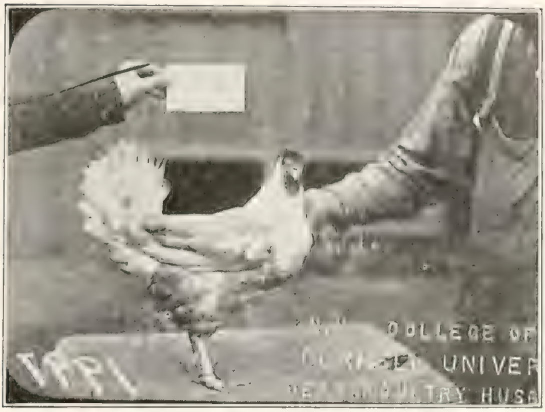


Fig. 17. Hen No. 61. An individual that gave the first clue to the factor of late molting as an indication of late laying and high production. Observe the fine egg type of a high producer.

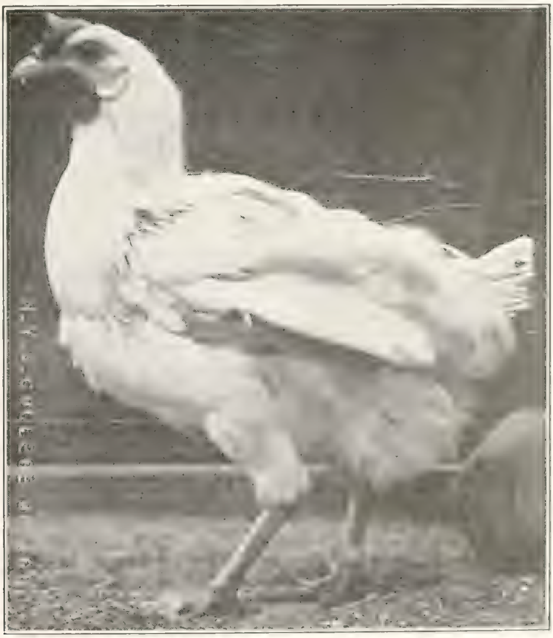


Fig. 18. Hen No. 61 in full molt just growing a new coat in the latter part of November

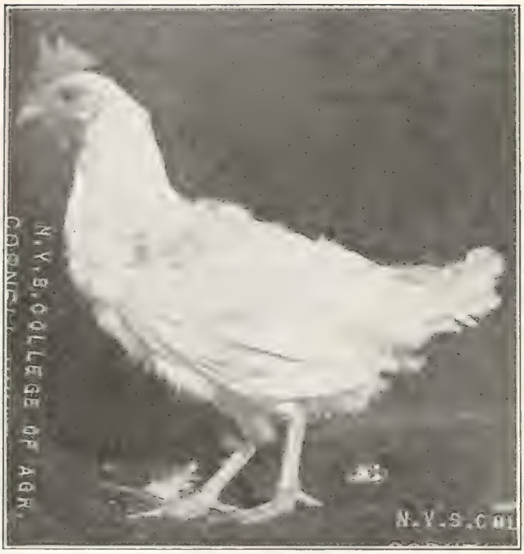


Fig. 19. Cornell Supreme in full molt, December 6th.

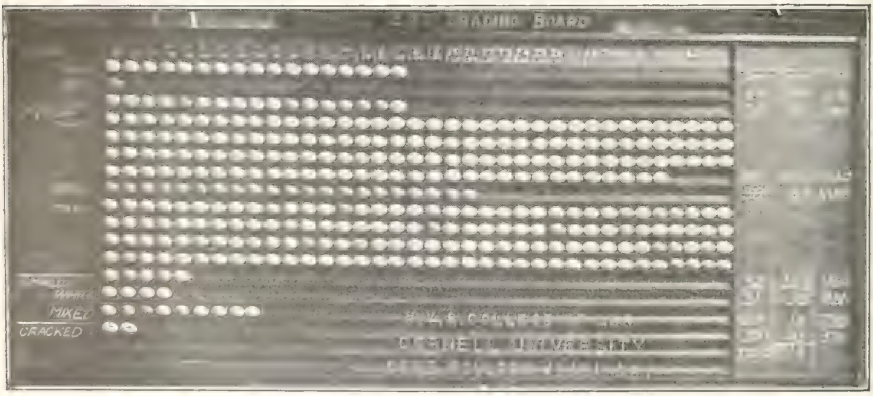


Fig. 20. The Cornell egg distributing board, showing a 30 dozen case of eggs of various grades to indicate the value of each grade and the total value of a case if all eggs were of any particular grade.

Table VI. Table showing the yearly record of hens arranged according to the number of eggs that they laid continuously at any time during the year.

One of the theories that has been advanced in regard to the methods of picking out high producers has been to find the birds that lay most continuously without a skip. We have picked out 15 birds from the flock representing birds of continuous laying qualities. These birds have been arranged in the order of the eggs they laid during three years. (Table 6). The highest producing hen laid 551 eggs and so on down to 163 eggs in three years, the lowest producer in that lot. The various hens had the second of continuous laying without missing a day as follows: 15, 5, and 6 days and so on for the others. Here is a hen, 7880, that laid 28 days without skipping a day, and laid 459 eggs in three years. Here is a hen that had a record of never having laid over two days consecutively and she gave us 65 eggs each year or a total of 163 in three years time. We have a record of one hen that only laid 3 eggs in three years time and did not lay these until toward the end of the third year.

I see that my time is getting away and that Brother Wittman is going to be crowded off the program if I do not hasten. In Fig. 17 is a picture of a hen that gave us our first clue in 1906 to the idea that the way a hen moults in the fall is an indication of her laying capacity. The late moulting of hens give us the second method of picking our birds as high producers. Let us review the steps. The first thing to do is select for vigor, the second is to pick out the early laying pullets; the third is to watch these selected pullets in the following fall of the year to find out whether or not they moult late and lay late. Late moulting is an indication of late laying. This bird (Fig. 17) laid us 200 eggs between January 24 and October 12th, when this picture was taken. The next slide, Fig. 18, shows that same bird in full moulting condition. You will notice that she has a perfect egg type, a body deep from the back to the keel, deep from the back to the abdomen, good, heavy shanks, set wide apart; well developed head, large, vigorous body. This slide shows the hen taken the last of November when she had completed her record of 216 eggs for the year, and at that time was the highest producing bird we had. This picture was taken a few days after she was at her worst; she had begun to get her new plumage but she gave the key to the whole situation as to that factor as a means of indicating production. There is a picture of Cornell Supreme (Fig. 19), the best hen we have ever discovered. That picture was taken the 6th of December. We find that every one of our phenomenally high producing hens those that lay around 200 eggs or more a year, are birds that do not moult until in November and December, and yet all these years we must confess that until these facts were brought out, we have been inclined to kill the hens that moulted late, just because they committed the crime of laying too many eggs. We thought that if hens moulted late, they would not lay early in the fall. The fact is that those hens that moult late begin to lay more quickly, frequently, than the poor producing hen that moult in July, August or September.

There are three distinct external characters that we have found and have tested out and therefore know will work, all of which can be put into practice without ever using a trap-nest. Now get these points clear. First, always pick out the hens that are vigorous and healthy; second, pick out those hens that moult late; and third, pick out the hens that have pale shanks; fourth, pick out the hens that have smooth texture to their combs late in the fall of the year.

Our Mr. Kent and two helpers, examined a thousand hens or more, whose records are known for a period of years. They examined them and made a record, first, as to whether they were moulting early or late; whether their shanks were very pale or very high color or anywhere between; whether the texture of the comb was soft and pliable or whether it was dry and hard; and they put those three characters together in the order of one, two, three, four, five in grades, from the highest to the lowest, that is to say, if a bird was all feathered out new, she counted as five because she was an early moulter; if she was all ragged at that time in October, she counted as "*one*" because she was perfect, a perfectly late moulter, or a hen might be anywhere between an early and a late moulter, one, two, three, four, five. They made the test as regards color of shanks, and texture of comb, and then added those figures up for each bird and, without knowing the records of the birds, because they were down in the office. They simply adding up the score of each one of those birds, based on that arbitrary mathematical figure of proportion of those three characters, and could tell with a great deal of accuracy whether these birds were high producers or low producers. They did this with all the hens that were trapnested simply for the purpose of ascertaining the facts.

Every farmer can take those visible characters with certain caution always in mind to guard against error in judgment. First always consider constitutional vigor of the bird—she may have pale shanks because she is sick, she may moult late because she is unwell and cannot shed her coat, she may have a dry comb because she is ill; the first thing to decide is that she must have constitutional vigor. Having satisfied that, then find out whether she is an early, medium or late moulter. Pick the late moulter. The third is, look at the color of the shanks. If they are pale, it indicates that she has laid the color out of her shanks. If they are high colored, it shows that she has been loafing around doing nothing but boarding on you and you are keeping her for the sake of her society. We have found some of the finest looking birds in our flock, beautifully plumed, their plumage shining and their combs red and their shanks as yellow as could be found that hardly laid fifty eggs a year. The fowls having soft, pliable combs are in a laying condition.

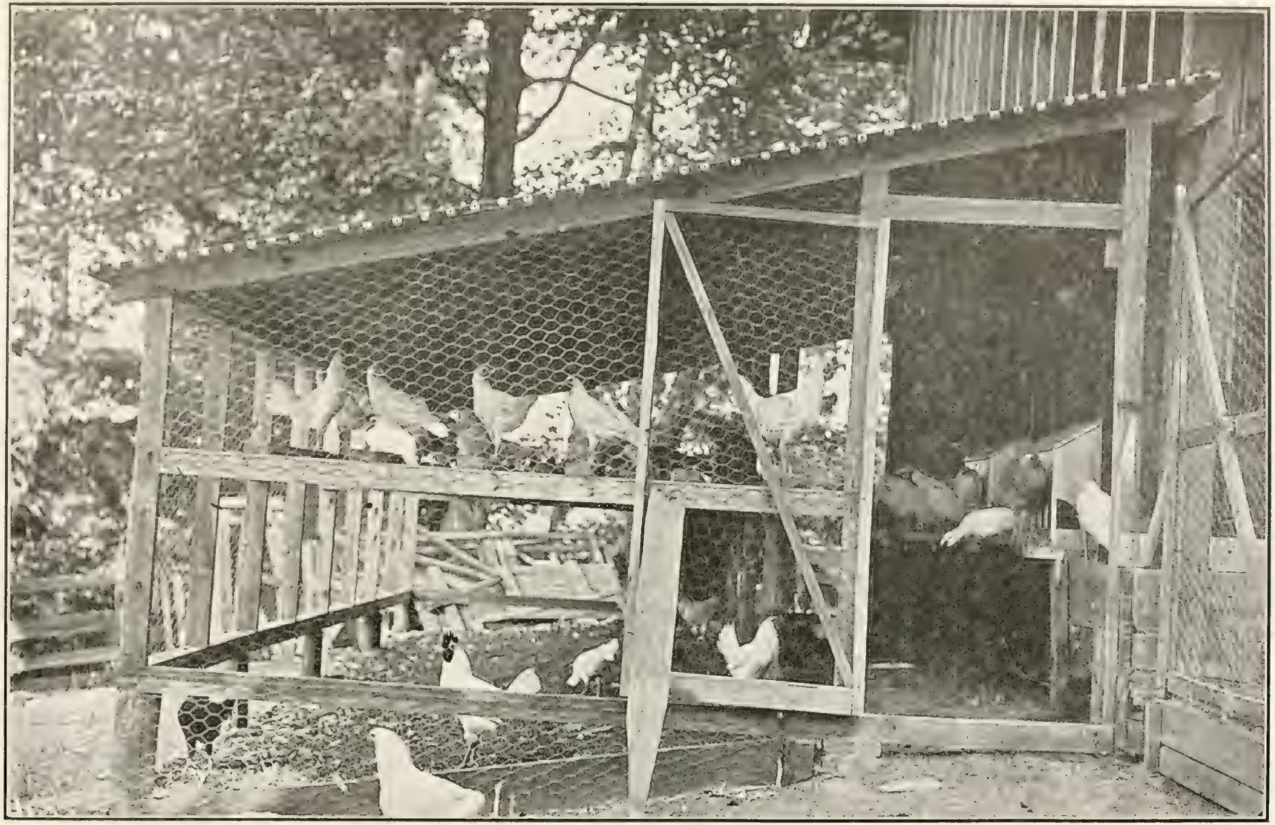


Fig. 21. An open shelter for the breeding males during the hot weather season, when males should be separated from the breeding flock to prevent fertilization of eggs and insure better keeping quality.

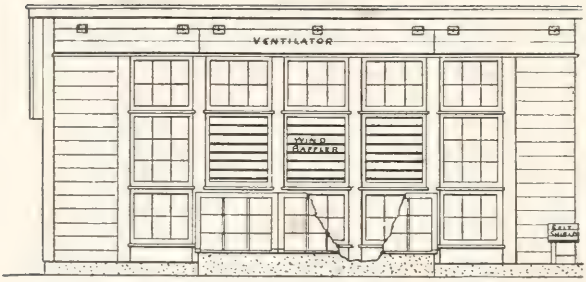


Fig. 22. The front of a modern poultry house designed by Cornell University to show the use of the wind baffler and a larger proportion of glass to insure greater warmth, dryness, sunshine and fresh air.

PRICES PER DOZEN FOR EGGS IN LEADING CITIES, NOVEMBER, 1910.

Grades.	New York.	Philadelphia.	Boston.	Chicago.	Average.
Large.					
Whites I,	.52	.35	.46	.35	.41
Browns II,	.41½	.36½	.46	.35	.39
Mixed III,	.37½	.32	.46	.33	.36
Medium.					
Whites IV,	.42½	.34	.43	32	.36½
Browns V,	.35½	.32	.43	.32	.35
Mixed VI,	.32	.32½	.43	.30½	.32½
Small.					
Whites VII,	.31	.26	.30	.29	.27
Browns VIII,	.28½	.25	.30	.29	.26½
Mixed IX,	.21½	.28	.25	.28	.24½
Miscellaneous X,	.19½	....	.17	.19	.16½

Table VII. Table showing the price per dozen for various grades of eggs in four principle markets of the United States, showing the great contrast in price due to size, shape and color.

Just a word now in regard to the quality of eggs. Breed for quality. In Table 7 are the prices that we secured by writing to large dealers in New York, Philadelphia, Boston and Chicago, and get the average of those four cities for eggs that were large, medium and small, and among each of those three groups based on size, whites, browns and mixed colors, so that we have 9 groups of eggs, large, medium, small, and white, brown and mixed colors of each size, and here are the prices in New York. The prices were taken in November, 1910, and the same thing would be essentially true this year, or perhaps—a little lower—large white, 52 cents; large browns, 41½ cents; mixed colors, 37½ cents; and yet they are all large, all weigh two ounces and a quarter or more, just the difference in color; all of equal freshness, all of the same candling quality in every way, except the mere matter as to whether these eggs were white, brown or mixed colors. Then come the medium eggs, that would weigh under two ounces, but approximately that; white, 42½ cents;—still more than the large browns; the browns, 35½ cents; mixed colors, 32 cents. For small eggs, the white ones, 31 cents; the browns 28 cents and the mixed colors 21½ cents. Now coming to the average of all three cities, we find the large whites, 41 cents; large browns, 39 cents; large mixed, 36 cents; mediums, whites, 36½ cents; browns, 35 cents; mixed, 32½ cents. Of the small ones, whites, 27 cents; browns, 26½ cents; mixed, 24½ cents, and extreme difference of 24½ cents as compared with 41 cents.

A Member: You speak of freshness; how old has an egg to be until it is not fresh?

PROF. RICE: Well, sir, that depends upon the season of the year and how collected. Eggs can be gathered once or twice a day, taken directly from the nest, carried immediately to a cool place, having fresh clean air, where they cannot evaporate, and may be kept there for a week's time and no one would ever recognize the difference in the egg and those newly laid. On the other hand, if those eggs were left in the nest or in a hot room, they would deteriorate more in 48 hours than they would in a week under ordinary, desirable cool conditions.

A Member: How about it if they were put in liquid glass?

PROF. RICE: That seals the pores and they retain their quality so far as evaporation is concerned all right but lose a little in flavor if they are kept for many months, but they are all right for almost all cooking purposes.

A Member: What is the difference in quality between an egg kept in cold storage and one kept in liquid glass, both for the same period?

PROF. RICE: The egg kept in cold storage frequently suffers on account of fungii entering the shell. There are several fungii the spores of which if the air is damp that can get through the shell of an egg in cold storage especially that affect the flavor and appearance of the egg but that cannot penetrate it at all in water glass. Water glass simply preserves the egg in the condition it was by keeping the germs from getting inside.

A Member: What is the difference between an egg that is fertile and one that is unfertile, if any?

PROF. RICE: I do not know what the actual difference would be if a fertilized and unfertilized egg were immediately put under the same cold temperature conditions. I do know that under ordinary care, the germinal spot of an egg that has been fertilized will begin to grow quickly, at a temperature of 70 degrees or about that temperature—and that is pretty low temperature too. It is living room temperature. When the chick begins to grow, the white patch due to cell divisions shows very quickly, and of course if the temperature is 90 degrees or near 100 degrees, as it is frequently on a hot day in a nest or in a kitchen that egg within 48 hours, would have a little white patch over the surface of it and might have a little red streak that would show to such an extent the egg would be unsalable, would disintegrate and go to pieces in cold storage. That is why the cold storage people would prefer to have February, March and April eggs, and keep them two or three months longer, than to put the eggs of June, July and August into cold storage. The liquid glass would not affect that situation due to fertilization at all; the liquid glass only affects the conditions that go through the pores of the eggs; the fertilization is affected by the temperature.

A Member: Exclusion of air has no effect on the progress of fertilization?

PROF. RICE: No, not at all, as far as I know; but you must get an egg cooled down quickly to at least 50 degrees or thereabouts to stop development.

A Member: Isn't it a fact that the Pennsylvania eggs which are going into cold storage in this State, or in other words, the egg that is going into cold storage in the State of Pennsylvania, is not a Pennsylvania egg, for the simple reason that the western egg is a better keeping egg? I cannot account for it by anything else except that a great many egg producers in the western states take the cockerels away from the hens.

PROF. RICE: Well, I want to say a word on that, because there is a great deal involved. I realize fully the importance of keeping the males away from the hens during the hot weather season; but I am not in sympathy, most decidedly not in sympathy with the slogan unqualified to "Swat the rooster," that is heralded all over the South, although undoubtedly it is more important for them than for us, because we have less length of hot weather season than they have. They mean all right in trying to keep the males away from the hens, that should be done even in this State, and New York State or anywhere; but the slogan of "Swat the rooster" results in the killing of thousands and hundreds of thousands of roosters all over the country that should not be killed and is defeating one of the most important ends of good breeding. They are forcing the breeders to depend upon the young and frequently immature males for all of their mating and they are killing all the fine males that prove to be desirable at the end of that first season, or the second season. How many of our males that have stood all of the tests of the most rigid selection as cockerels, break down in the second year? And then how many fall by the wayside in the third and fourth years? When you can find an individual that has stood up through all these breeding seasons and still has virility and vitality, that bird is a bird in a thousand, and we cannot afford to sacrifice him. What would become of the beef or the dairy and horse interests of this country if they depended upon yearlings or two year olds for breeders every year? The principle is dead wrong to kill off the males each year. We must keep our best males just as long as they retain their vitality. We must find a way to take care of them during the breeding season and after the breeding season so they will not suffer in vitality.

A Member: Do you use that male on his own flock the following year, for two or three years?

PROF. RICE: I think that question has never been very well worked out, as to how long it is safe to breed the same sire upon his own offspring, yet my opinion is that the tendency of close in-breeding has the effect of reducing longevity by killing off the males that ought to be kept on their farms for breeding for a period of years. I tell you, friends, when you get a male that is good enough *to breed from*, he is one in a hundred perhaps, one in five thousand. If you never have gone through the experience of reducing 100 males by the rigid process of elimination of the poorest down to the two or three best, you have never gotten your full education.

A Member: Isn't it a fact that the male you describe is no longer a rooster, but that he is a breeding animal?

PROF. RICE: Yes sir. He is a breeding animal, but he is also a rooster. If they could only make the distinction between good roosters and poor roosters it would be all right. I am not saying this in criticism, Mr. Wittman, I am saying though, that the way in which the "Swat the rooster" campaign is promulgated through the country gives the farmer the impression that he should kill every rooster in sight. Now that is not right. I would rather have a male that is two or three or four years old and equal in vitality as he frequently is than I would a cockerel of the same variety; you know just as well as I do, men who have had much experience in selecting males, that you may pick five males out of a hundred and breed them for one season and find that several of them have lost their vitality and virilty. I know that you can in-breed and retain vitality and you can in-breed for high vitality and increase it, but I believe that the tendency of mating together close relationship is wrong and we ought to get outside of our own lines occasionally, but I also want to say that more people make the mistake of trying to get new blood into their flocks every year just because of the supposed desirability of new blood, than the people who stay pretty largely within their own lines. We never can make permanent progress in improving the quality of our eggs or the number of eggs laid if we are going to get somebody else's males or females into our flock every year or two. The chances are that we may reduce our vitality, we may reduce our general quality—we may reduce both the number of eggs and the quality of the eggs by so doing. What we want to do is to find some person in our neighborhood who is doing the same kind of breeding we are and then exchange the best birds with him. Let him pick these from your flock and you pick the best from his.

In Fig. 20 is seen how a 30 dozen case of eggs looks picked up in the country at random and graded according to the three sizes, three colors, as indicated in the previous slide, then figured up at the following prices for each of those grades. That particular case of eggs, under those circumstances, would have been worth $11.14 at the prices quoted for each grade separately and sold at the grade price. If, however, that 30 dozen case of eggs had all been of the first grade, large and white, it would have sold for $15.60 instead of $11.14. If, however, that whole case of eggs had been of this small, mixed color eggs, it would have sold for $7.80, instead of $11.14. When one can make a difference of 5 cents to 10 cents a dozen in the price of the eggs and a hen lays 10 to 12 dozens eggs a year, you can see for yourself that five times eleven is 55 cents, gross income per hen due purely to the quality of the egg she lays.

The figures show an important principle in selecting eggs for hatching; if we are going to get eggs that are of large size we must use the same kind of an egg for hatching. If we expect to get birds of good size, we must use large eggs for hatching, assuming that we have the same breed under consideration. Here is the way it will will work (Table 8.) Here are eggs that were selected as small eggs; they weighed 1.66 ounces; here were eggs selected from the same flock that weighed 1.90 ounces; here were large eggs that weighed 2.35 ounces; now then, at the end of the time when those chickens were hatched, the eggs were in the proportion of 100 to 114 and 141. Assuming the first ones as one hundred, then these were 114 and these were 141 in size. This is at the time of hatching. Now here is the weight of the chickens when they were 20 weeks old; 1.87, 2.29, 2.65; and here is the proportion which you can compare with that: 100, 122, 142. There are the actual weights of the eggs out of which the chickens hatched. Here is the weight of the chickens from each of those groups, 20 weeks old, and here is the proportion; in other words, one hundred is to 141 as one hundred is to 142; in other words, the size of a chicken of any given variety is in the proportion of the egg out of which it was hatched. If you want to get a large sized chicken, pick the good sized eggs to get a good sized chicken to lay a good sized egg to hatch a good sized chicken.

WEIGHT OF EGG TO WEIGHT OF CHICKEN.

Eggs.	Average weight of eggs.	Per cent. weight.	Average weight chicken 20 weeks old.	Per cent. weight.
Small,	1.66 oz.	100	1.87 lb.	100
Medium,	1.90 oz.	114	2.29 lb.	122
Large,	2.35 oz.	141	2.65 lb.	142

Table 8. Table showing the exact weights of eggs and of chicks indicating the fact that the size of the egg of any given breed determines the size of the chick.

Fig. 21 is just a suggestion for keeping males cool and away from the hens during the summer time. It means that there must be a wire covered place that could be locked up so that the chickens could go in and out; on the north side of some building where it is cool, comfortable and congenial, with a large number of feeding hoppers and watering devices, both inside and out of the building so that the strong males cannot fight the others. The great difficulty of keeping many males together is in making them all go to eat or drink out of the same places. If they are scattered all through the woods, with plenty of room to range and lots of room in a building where they can get away from each other, it is not so difficult to take care of them for that length of time, and I think we owe it to our stock to keep our best males rather than to kill them; but if we were to "swat" all the rest of them, it would certainly be a great blessing to the community.

Finally, and lastly, we want to bring out the fact of good care of our birds during the winter if we are going to get the best results in breeding. No amount of good breeding will ever take the place of poor ventilation of our hen houses or poor care of our hens, and while it will not be possible to speak of these things in detail here, I want to point out for a moment a new idea, at least new to us, a method of ventilation to take the place of the muslin curtain in certain parts of the United States. I do not know that it would have application in the south but it certainly does in the north. This is a wind buffler, not an ordinary shutter, but a combination of louvers placed at different angles to prevent the snow, wind and rain from blowing into the house and for allowing the air to change freely through the house without draft. In Fig. 22 is shown a building that we used for two years to test out the efficiency of these wind bufflers. There is a little more glass put in the house to make up for the darker effect of the wind buffler in place of muslin. This picture (Fig. 23) gives a little better idea of the wind buffler, cut right down through to show the arrangement of baffle plates. You can see what the principle is; the wind, blowing from the front of the house, comes up and strikes that louver there and whirls, it comes up in here and whirls around over here and makes a counter-whirl so that it cannot get into this house until it has turned over several times and then reversed itself in the other direction. A person can stand two feet behind this wind buffler in the house with a heavy head of wind coming from the south and never know that the wind is blowing. The snow cannot get in, the rain cannot get in, but the air can change place through all the half inch or three quarters. The air circulates more freely than where muslin curtains are used; and that enables a person to put these wind baffles in the front of his house without ever having to touch them from fall to winter, and your hens are never in a draft and always have perfectly clean, fresh air if the proper proportion of the front of the house has the wind baffler construction. I know very well that I have long since exhausted your patience. I ought not to have brought so many lantern slides with me nor talked so long to each slide. I apologize, and thank you very sincerely for your attention.

FORTY POPULAR VARIETIES OF POULTRY

W. THEO. WITTMAN, *Allentown, Pa.*

Mr. Chairman, Ladies and Gentlemen: I am not at all disappointed nor do I feel at all bad that Prof. Rice has taken so much time. We poultry people at least give credit to Prof. Rice's standing head and shoulders above everybody else in this country in his knowledge of poultry, and I am particularly pleased that he has had the chance to give us all or at least part of what he knows here this morning. I am especially pleased that he has given us agricultural workers of this State a message to take back home that the farmers of the State of Pennsylvania should quit having so many late hatched chickens. You know quite a number of farmers in Pennsylvania are just beginning to think of setting hens or just beginning to have their first chickens, and here it is nearly June 1. I am very glad that he has shown us here on this screen that 60 eggs is a very low egg yield, and I am sorry that the farmers of the State of Pennsylvania showed in the census enumeration of 1910 that their hens laid only 68 eggs. Take that message back home so that in 1920 the farmers can give a better report to the census enumerators. I am especially pleased that he brought the message. We want pure bred chickens, and it is a shame that in Pennsylvania some of our fine farms are disfigured and brought

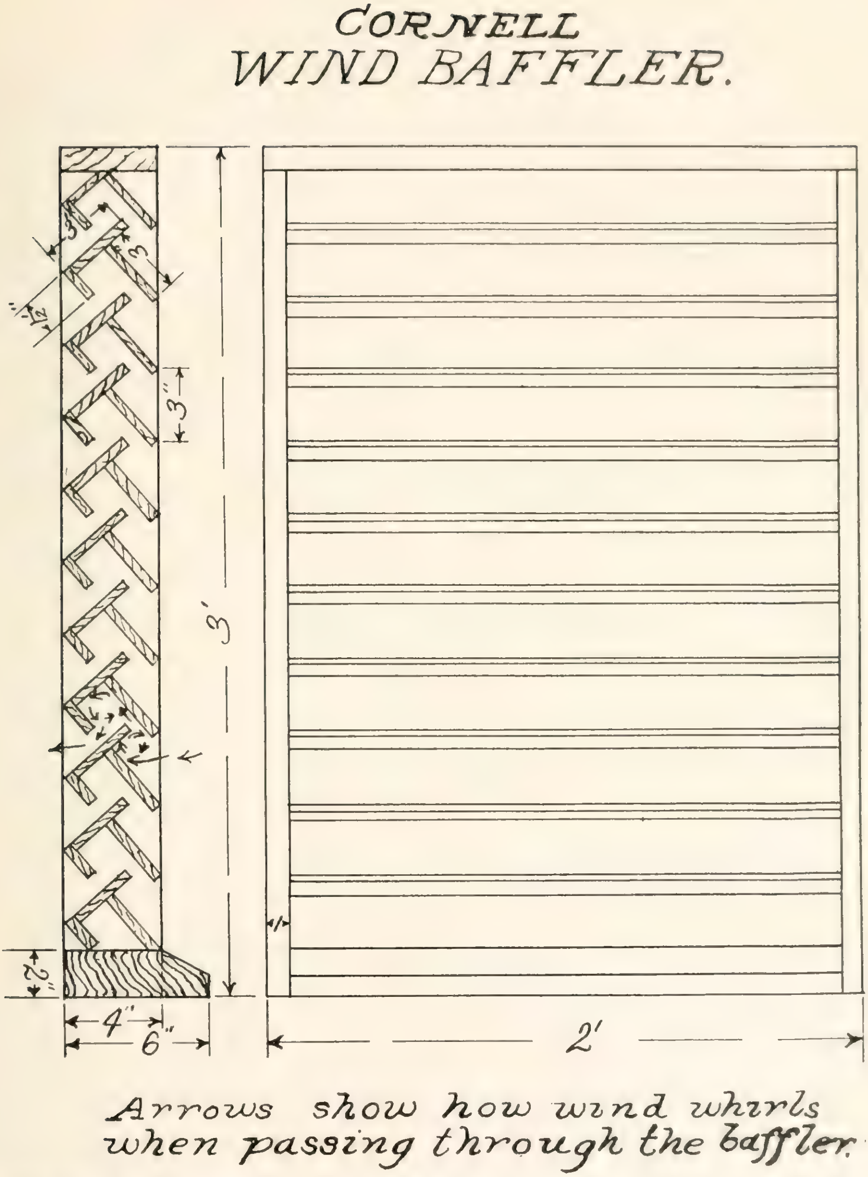

CORNELL
WIND BAFFLER.
3"
3
½"
3"
3'
2"
4"
6"
1"
2'
Arrows show how wind whirls
when passing through the baffler.

Fig. 23. Working detail drawing showing the construction, front and cross section, view of the Cornell wind baffler which effectually provides for free circulation of air without drafts.

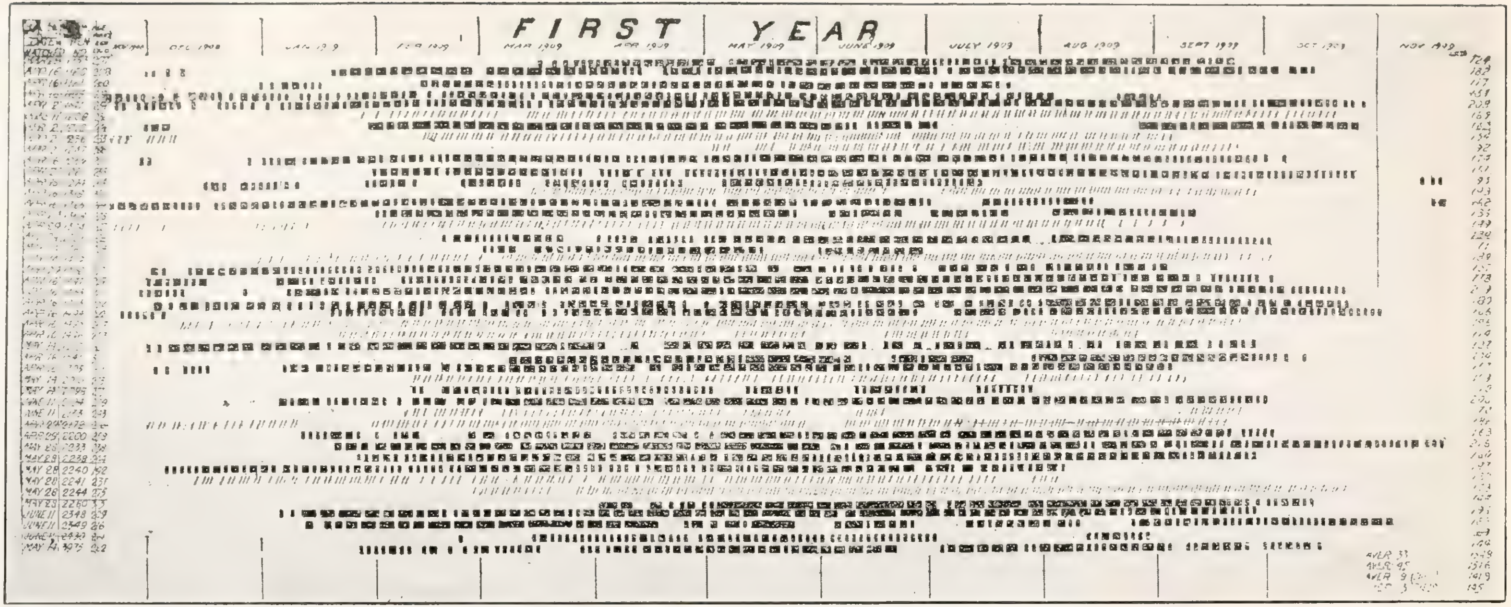


Fig. 24. The first year production of 45 hens, showing the days that they laid and the days that they did not lay each day of the year. Observe how the production increased after the month of December and ceased after the month of September in the case of most of the fowls. It will be seen that usually the birds that began earliest to lay continued to lay latest the following year.

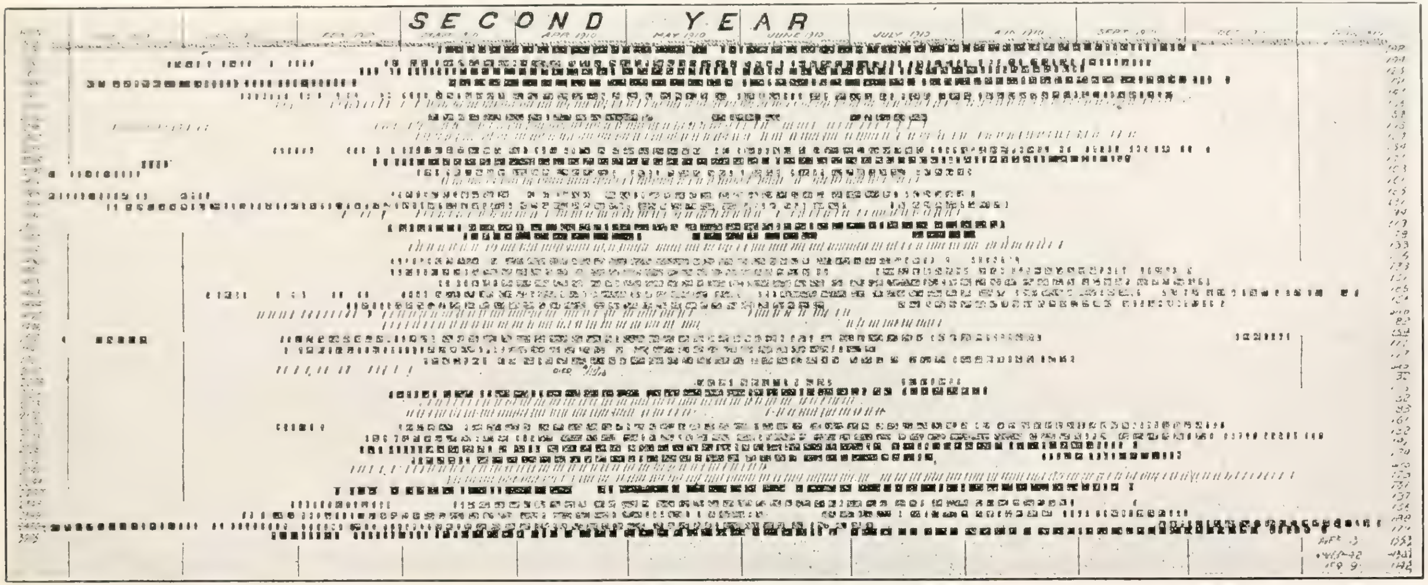


Fig. 25. The daily production of the same 38 hens shown in Figure 24. Observe how much later the birds began to lay, as a rule, in the second year and how much earlier they ceased laying at the end of the year.

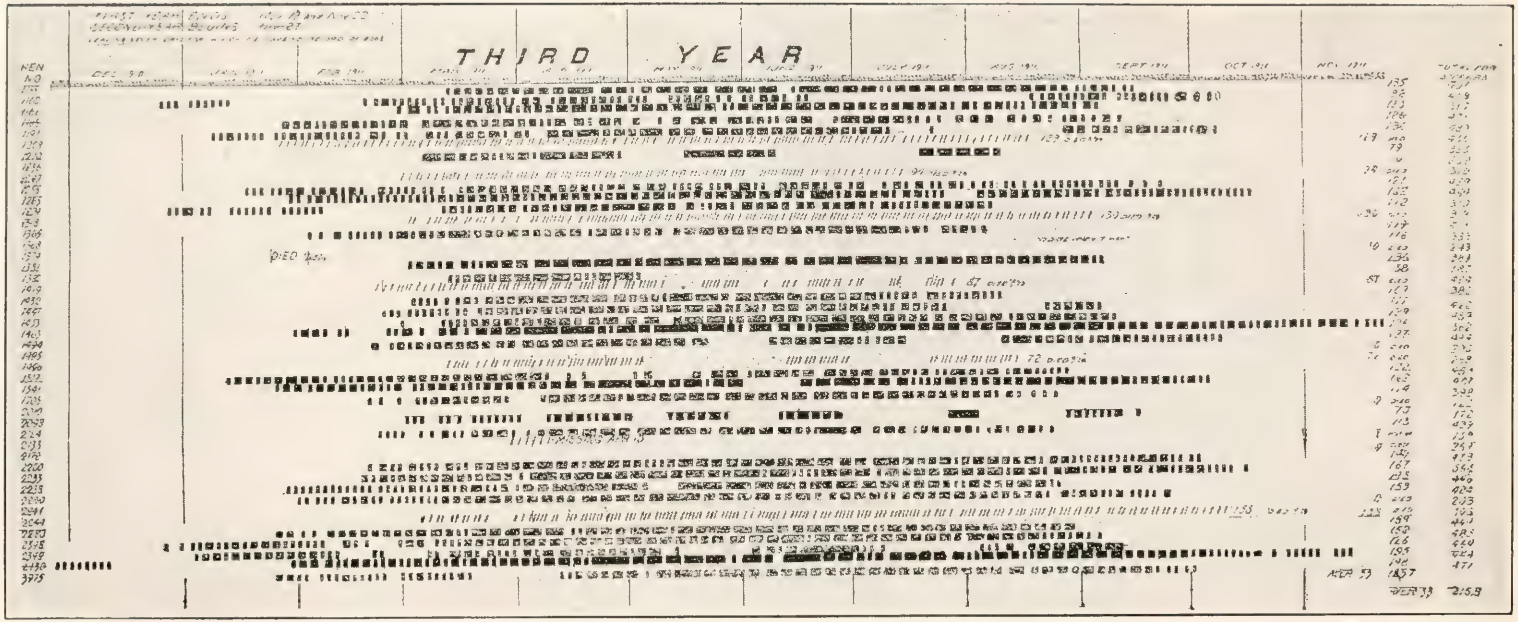


Fig. 26. Third year production of the hens shown in Figures 24 and 25. Note a still greater tendency for the birds to begin to lay later in the fall or winter and cease to lay earlier the following fall; whereas, the production in each of the years maintains nearly the same intensity during the months of March, April, May and June. Note also the difference in the length of the periods when hens lay continuously without skip. Usually this is in the case of the better producing individuals, but not always.

down in mine and everybody else's estimation by the sort of mongrel chickens they have on their farms. I am very glad he has said this and a great many other things, and I hope that we agricultural workers will go home and be a nucleus in our own neighborhood and will set an example and that we ourselves will not have hatched mongrel chickens and will not kill the early moulters and things like that.

This morning I am going to try to tell you which is the best chicken. Those of you who heard me talk know that I have always evaded that question, for a good many reasons, First of all, perhaps, because of my position as a worker, knowing the prejudices a great many people have on a particular question. As an officer of the American Poultry Association, I have tried to be as loyal to their standard as I could. I have evaded the question perhaps, because I am a licensed poultry killer and because I am manager of one of the largest poultry shows in America. But this morning I am going to try and forget all that, and directly and individually, as I feel to-day, tell which is the best chicken or which is the best variety of poultry to keep; or, rather, I am going to try to help you so that you can tell which is the best.

Now we are going to show some slides, not very many. The program says "Forty Varieties of Poultry." I'm going to tell you, "Forty Varieties" came about something like this: Several years back the American Poultry Association for the first time voted quite a large sum of money that the different forty most popular varieties of poultry might be shown in lantern slides. It seemed to be very hard to find some firm that could make those pictures. Then the cry went up as to which were to be the forty. So a little later the American Poultry Association decided that all the standard varieties, something over a hundred, were to be shown like this. At last they are ready to do this. We have tried all the big slide makers of the United States, and you are going to see on the screen here this morning slides made by Williams, Brown and Earle, of Philadelphia and the Horace MacFarland Co., of Harrisburg. You are going to see some slides made by firms in Chicago, Boston and New York, and this is the very best they could do. I am sorry to say they are not up to type; in other words, the new standard, the 1915 standard, containing the illustrations of the very latest types of chickens is not out, and on account of the copyright law, we cannot show the newer type until the book itself is in circulation; but we will be ready to do that by the time of the World's Fair in November—I mean the poultry show in November, and they will be shown there for the first time.

These pictures I am showing here this morning are samples. There are going to be two kinds of chickens here; you had a hint that there are going to be two kinds of Barred Rock. I am going to show, first of all, the standard types, the type that the chicken fancier is trying to get, the type that is winning in the show room, not only the type but the color, and here we have the most popular chicken in America so far as the farmer is concerned, or at least the chicken that was the most popular chicken on the farms of Pennsylvania, the Barred Plymouth Rock. The fancier of Barred Plymouth Rock has had one thing in view, to get a peculiar shade of color and have his male and female alike in color; if you will stop a moment, you will remember that your males are a good deal lighter in color than your females and there are very few that have the markings of these particular chickens. You will notice a bluish cast, the feathers are pure black and white but are so distributed that the effect is a bluish pink. There has been endless time, patience and money spent in developing these fancy points. We have men in America who are known the world over, our Hawkins' and our Thompson and our Bradley and Wells, men whose names practically everybody in the room has heard, that have spent their lifetime in developing this Barred Plymouth Rock and bringing out these fine lines, and they go down to Madison Square Garden and fight the old battle over year by year as to supremacy, to see who can bring birds with the most parallel bars. Those bars on those feathers had to be parallel, straight across, so that we can have these ringlet effects. Those who have not been poultry fanciers have no idea what is required along the breeding line to bring about something like this.

We want to give due credit to the men who have been able, as a result of spending a lifetime of the keenest sort of work to be able to show this sort of chicken. It is not easy. I have knocked around the show rooms pretty nearly all my life; I remember the very first chicken I showed, when I was only a boy of ten, but it was a mighty fine chicken, I thought. I paid a dollar to enter it in the poultry show, my own dollar too, and the judge came along and disqualified it; I didn't even have a run for my money, and when I was 17 somebody thought I knew enough about chickens to judge my first poultry shows and he went to the president of our county fair and got me a job and I appeared and introduced myself to the secretary and he asked me to repeat what I'd say; he was polite enough not to say anything more, but when I got out into the hall one of the men, when told I was to judge chickens, said, "That fellow is only a kid," and since that I have heard more than once that I don't know anything at all about chickens and I guess it is true, but I have been through that hard knock school of experience in judging poultry and I know what it is to get birds of this type.

Understand when men are breeding chickens, to get this type, they may have it on paper or they may tell it by word of mouth that this sort of chicken lays eggs, but they really don't care whether a hen like that lays one egg or a hundred, and they will breed her whether she does or not, and they will use the progeny from that sort of hen again and again, and it would be foolish if they didn't do it. A Barred Plymouth Rock like these, I have seen sold for $100, $200, $500 and $800, and if a chicken like that is worth $800 and lays only 8 or 9 eggs a year, her eggs are worth some money. But I am not quarreling with those fellows who claim that that is the sort of chicken the farmers and utility poultry men should have and sell their eggs from this sort of chicken to the farmer and men who try to make a living out of their chickens. Within a month I was with a city man whose health has broken down and he bought a Pennsylvania farm nine years ago. The girls are off at work, but the boy is 16 and is going to school. The father is trying to pay the mortgage and the mother and the boy are trying to help with chickens. Four years ago they bought some chickens from one of these chicken fanciers, these purely fancy chickens. He brought these chickens to his Pennsylvania farm; they are low in vitality, they have never paid, they have simply lost their money. Why, to my notion it is a crime for any man, for any chicken fancier to sell that sort of chicken to that sort of person. It is not fair, and I do wish the chicken fancier, much as I respect him—it is a profession that I belonged to for many years—I wish he would quit that, quit fooling our Pennsylvania farmers and our people who are trying to make good with their chickens.

Now notice the difference; this is a work-a-day hen, a Pennsylvania hen. This is the hen whose mother and grandmother and great-grandmother and great-great-grandmother has been bred for egg producing. This is a hen that laid 283 eggs. This is a hen that could not win in any poultry show in the United States. You can compare the two types; one is a show lady and the other a work lady; you see the difference; feathers is everything here; the ability to lay eggs is everything with the other hen. This man had only one thing in view, to see how beautiful, how exquisite he could get his chickens, and just as long as there are men and women that love the beautiful flowers and beautiful painting, just so long there will be men and women who will love the beautiful chickens and just so long will there be poultry fanciers, but most of us I am afraid want the other kind of hen.

There is quite a difference in type in these Barred Plymouth Rocks. The owner of this hen—and he is a Pennsylvania man and a well known breeder—will tell you if you ask him to describe in a word this chicken, he will tell you that she s a Leghornized Barred Plymouth Rock. That is his description. I think you all get what I am talking about. I fear that the chicken fancier has made of his Barred Plymouth Rock a member of the "pound" family; it is not usual to find in other types of Barred Plymouth Rock birds weighing 8 or 9 or 10 pounds, but if the Barred Plymouth Rock is to be a worker and a layer, it will have to be reduced something in weight. Now we have some White Leghorns. I was talking of Barred Plymouth Rocks and the emphasis we put on Barred Plymouth Rocks and how many men had been working at it, and the same is true of White Leghorns, only a New York man was able to outstrip everybody else and his name is known the world round, and to-day it is simply impossible to win anywhere in any poultry show in the United States of America unless you have this man's White Leghorn. A great many in the room know whom I am talking about. This man has had a wonderful income the last few years because he created this kind of chicken. This sort of chicken is the result of many, many years of very faithful and very enthusiastic labor, because he will talk chickens from morning to night and then some. He gave up a wonderful position so that he could devote all his time to chickens. He has given us this elegant, stylish, beautiful White Leghorn, and everybody who admires the beautiful, it seems to me, cannot help but admire that bird; everything is a curve; the beautiful head, the style, everything that we think is exquisite in chickens is embodied in that type of White Leghorn; but again I fear that this is not a workaday chicken; in fact I know it to be true, I know it to be a fact, that if you ask the man who produced this chicken why it is that his chickens lay so few eggs, when you get him down in a corner all by himself, why these chickens lay so few eggs, he will tell you that the original mother hen laid that sort of an egg.

Now we have a different kind of Leghorn in the last few years, and I am sorry she is not the Pennsylvania Leghorn and not the United States Leghorn either; she is an English Leghorn. Now I don't know why it is that the English Leghorns lay better than the American, but I guess they do; it seems to me they do. Every large commercial egg farm, if they don't have some English blood already or don't have their large flock English, are thinking of doing it, with one exception—I only know one large farm in Pennsylvania that does not want English Leghorns. If there is any reason why these English Leghorns lay better than our show type of American Leghorn, it is because of something we heard so much about this morning, vitality. I was in a large brood house in Pennsylvania where there were 12,000 chickens, 2,000 English White Leghorns, and I believe I would have undertaken the task of picking them out nearly to the last one as two year old chickens already. You can pick out the English White Leghorn. It never droops its wings, it is a strong, vigorous chicken. These chickens were grown on Pennsylvania soil; their parents were English Leghorns; they belong to a farm down in Lancaster county and were imported. They are five chickens that came very close to winning the last North American Egg Competition. They stood second. There were 50 or 60 of those chickens down on that farm, and it would be very difficult to get 100 chickens that yould each lay 200 eggs in some one year. I believe you could pick out a lot down there that were full sisters to those chickens. Every one laid considerably over 200 eggs. They are magnificent so far as vigor and vitality and ability to lay eggs is concerned. I don't know whether you think this is the prettiest, because I showed birds similar to the other five at the Pittsburgh Poultry Show, the largest in Pennsylvania, this last year. I mean the best attended. There was five of those birds there. There was a long aisle of this kind; there was 10 people looking at the other kind where there was one looking at this; in fact this aisle having this sort of White Leghorn, seemed to be deserted, but the aisle with the other five had a crowd, in fact finally the Superintendent of the show insisted that they be moved because they were blocking the aisle; and time and again people came to me and said that of the two the other was the prettiest. Now this is our idea, the chicken fancier's idea, of beauty, and we leave it to the audience to say which is the prettiest, the workaday or the show type of White Leghorn. There is a terrific difference between the two; we have almost a different variety of chicken; you would hardly think they were the same variety of chicken.

Now, because the time is short, I am going to hurry on to the next breed, the White Wyandotte. This is the show type of White Wyandotte. These are Pennsylvania chickens; they are not the present standards but will give you a pretty good idea of what the breed of White Wyandottes are. That is the trouble, the slide makers don't get all the details, because they don't know chickens; they should have put deep yellow legs on there. But anyhow, that is the show type of White Wyandottes. We want a very deep broad, blocky bird. These chickens are almost as broad as they are long.

The breast is very full, very abundant. This White Wyandotte, if plucked, would have a blocky body. Notice the fine comb and the refinement of type that you see everywhere; that is the fancier's idea of what constitutes a White Wyandotte. Now let's have the other kind, the workaday White Wyandotte. Those of you who are interested in egg competitions, remember the late North American egg competition and that for once the White Wyandottes beat the Leghorns, and this is the sort they were; you will notice the long body; in fact they are Leghornized White Wyandottes. The editor of one of our farm papers said they were simply White Leghorns. That is not quite true, but it is almost true. They have the narrow back; you see what a difference, instead of that great big wide back they have a narrow back; in fact we again almost have a new breed. This is the workaday White Leghorn. It is up to you again to say which is the prettier.

It seems that the American Poultry Association up to this time has made their standard—well, if you will tell me who makes women's fashions, I will tell you who makes the American standard of perfection. I don't know; it is simply a fad or a fancy, a changing fad or fancy not based on anything solid or substantial. Sometimes the American standard of some certain variety is simply based on a fad of one man, one fancier. I shouldn't have any quarrel with that, it put more money in my pocket at a certain period than any other chance of making money I ever had, but I don't think it is quite fair, when we come to sell this kind of chicken to the man who wants to get dozens of eggs or pounds of meat.

Now we have the laying type of White Wyandotte in this chicken. Notice the very large, high comb on two or three of these hens, almost lop combs, they were so large they would drop over. I am proud of the fact that Pennsylvania poultry people have been exceedingly liberal the last year in giving up their good dollars to get these good layers, it didn't matter who owned the birds or where they came from. They got the best they could buy, and these chickens we are looking at are to-day on Pennsylvania poultry farms and have high records as layers.

We have here Rhode Islands Reds. Now when I said that the Barred Plymouth Rock was the most popular chicken on the farms of Pennsylvania, I am afraid that to-day this other breed is leading and is slowly but surely pushing the Barred Plymouth Rocks off the farms of Pennsylvania. I don't know why, except that perhaps this is a better chicken. I am only showing four varieties of chickens this morning; these four varieties practically cover what is really popular to-day in America, the Rocks, the Wyandottes, the Reds and the Leghorns. Take the Campfire—just two years ago everybody was buying Campfires. On one farm I visited this season, the five first prize Madison Garden winners are not found at all. The general public seems to have simmered down to these four varieties. The farmer seems to like this Red. I don't know why the Red is good except that the American Poultry Association has done less to spoil the Red as a utility bird than any other breed. The Barred Plymouth Rock, to get the colors I was showing you, we have three distinct breeds, a controlling and pullet line. A certain line of chickens we breed together, male and female, to give the female a certain shade and color and then bring the two together. The one big stumbling block in the way is to get this color, and the slide makers have not been able as yet to get the correct shade of color in Rhode Island Reds, but this gives you some approximate idea of what constitutes color in Rhode Island Reds, one even beautiful red color. Now let us have the workaday Rhode Island Red. There is quite a difference. You at once notice that the man breeding these chickens did not pay so much attention to color; it was the ability to lay eggs, and again you notice something outstanding in these five hens; what is it? Vitality. Don't those chickens look as if they were really alive? And they are. I have had the chance to watch them a great many times and look them over and they are that way on the Pennsylvania farms; they are alive from start to finish, and is there any wonder they are beating the others in laying eggs. The reason is because they are alive and because the men who own them have been careful to look after vitality and vigor, so far as breed is concerned. I intended to say a whole lot more about these different grades, but unless you want to ask a question or two, I shall stop right here. I have given little hints of what the general public has found to be best, and you will be pretty nearly safe in following these four breeds and not getting outside of them if you want to get the best chickens.

THE DRAFT BREEDS OF HORSES

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Ladies and Gentlemen: I am a little disappointed because the quartet didn't sing, "A Hot Time;" I believe that would be more appropriate than the song they rendered. We are having rather a cool reception to-night, and if you become too much congealed and will indicate that fact, I will close at any time.

You may wonder whether or not it is worth while to devote a place on this program to the discussion of horses. I don't know anything in the way of farm products at the present time about which there is any more question than the production of horses. I do not propose to take up the answer to that question, because we haven't time; I can merely emphasize two facts. In the first place, I admit that the horse market did not recover this spring as a great many of us thought and believed it would. That, however, was not the fault of the horses nor of the men behind the horses. You know if you go by the market quotations as a criterion of the standing of horses as a farm product to-day, you will be somewhat discouraged. It is a fact that the horse market is off, but it is not very hard to determine the cause. If you go to the city or simply read the papers, you know there is a certain amount of business stagnation still; concerns that have been working a hundred horses perhaps are only working sixty; they not only are not going to keep up their full quota of a hundred, but they may have turned that extra forty on the market, so there is a practical glut on the market and very little doing in the purchase of high class stock of horses, but the reason is easy of explanation—simply there is not the demand for horses and we firmly believe that with the return of normal business conditions and traffic, etc., incident to normal business activity, the horse will come back to his own. I can further assure you that those who know the situation best and have an opportunity to follow it into the future, are still pinning their faith to horses, so there is no reason why we should feel any discouragment, and no reason why the horse should not have consideration on the program the same as other farm products.

You may also wonder what can be said about the draft breeds that has not already been said, this being a very familiar topic. It is my purpose, however, to discuss these breeds from a little different angle. My object is to induce you, if possible, to study the breeds with which you are engaged with a view of making out what you can learn of their history, what possibilities may lie before them in the future; that is, we can foretell best about those things of which we can learn the most in history. I don't know of any line of business where a man starts out with as little foreknowledge as in the breeding of pure bred livestock. I do not mean now simply the principles of breeding. A man may know all about the principles of breeding and may be an authority on heredity and principles of that sort, yet if he does not study the history of the breed itself with which he expects to engage, he is very much in the dark as to what he is doing and what can be done. Therefore, I would like to take up the breeds of draft horses. We have to limit our subject and limit it to them, and I would like to take up the breeds of draft horses with a view to bringing out from a consideration of their history, what is inherent in them and how, by a knowledge of their inherent characteristics, we are better able to get the best out of them. It seems to me that this is especially essential.

I am going to show you some statistics a little later; I am not going to burden you with them, but I have one slide that will show what a dearth of pure bred stallions we have available for the breeders in this State, or the country for that matter. This State is a little worse off than some other states, and is better off than others, but there is a dearth of pure bred stallions available to the breeders. If this is the case, doesn't it behoove us to make the most use of the blood available and the most judicious use—make the most of it? And it is with that in view that I propose to discuss the draft breeds.

In the first place, what is a breed? I say a great many men are breeding pure bred stock, and yet I believe I am safe in saying that they don't know exactly what they are dealing with and it will throw a great deal of light on some of the results they get if they will just inquire and find out a little more about this thing they are dealing with. They do not realize that they have the embodiment of an hereditary force placed in their hands, and unless they know the extent of that force, the characteristics carried on by that force, they can accomplish very little in its direction. For instance, a breeder of Angus cattle is very much disheartened, and perhaps thinks somebody has put over a counterfeit pedigree on him when he has bought a bull and gets a red calf. I have known Angus breeders to become very much incensed because out of their pure bred, as they supposed, black cattle, there is all of a sudden a red calf born. If a man knows anything about the history of Angus cattle, he knows that the occurrence of a red calf now and then is perfectly normal and does not cast any reflection upon the stock he is working with. In the same way a man dealing with Berkshire hogs perhaps notices a sandy tint in some of his pigs and is disposed to think that someone has sold him as pure bred Berkshire, hogs that were not pure bred. He does not know that at the earliest time in their history, the pure bred Berkshires were red and the recurrence of this is a perfectly normal thing. Another man sees black spots on the ears of his Leiscester rams and begins to doubt the purity of their blood, and yet if he will go back in history, he will find that the man who founded the breed used as the most potent element in his flock a black ram and it is perfectly natural to expect black spots on the ears of Leicester rams. That gives you some illustration of what I have in mind about being able to account for things that happen and able to plan for things that have not yet happened but which can be brought about by the intelligent use of this blood.

We have J. H. Sanders' definition of a breed—it is a group of individuals possessing distinctive characteristics, (and I would like to emphasize the distinctive characteristics) not common to other members of the species. It makes a breed the division of a species just the same as the species is a division of a genus, and the second part is that these distinctive characteristics must be so firmly fixed as to be uniformly transmitted. We have a great many groups of individuals that possess distinctive characteristics not common to other members of the species, and yet those do not constitute breed groups for the simple reason that those characteristics are not sufficiently fixed to be transmitted. We could refer to a great many cross breeds. You take the cross breed and we can produce in poultry certain plumage conditions with a high degree of regularity by certain hybridizing processes, and yet you cannot take the cross breeds and get any distinctive results. In the same way the cross bred bullock in England and Scotland is produced with great regularity; blue-gray is produced by the mating of Newfoundland White Shorthorns and Angus Galloways, yet they have not qualified as a breed. As you study breed history, you find that some breeds have passed through an evolutionary period. Take the Oxford breed of sheep; it is a composite breed, almost a cross breed, the blending of two distinct types. Up to a certain time, those cross breeds would not breed with any degree of uniformity. The cross breeds themselves fulfill the first half of our breed requirements; they possess distinctive characteristics but they would not transmit them always until the breed had been so intensified that they would finally breed with a high degree of uniformity. The Oxford was accepted as a breed and classes made for it at the shows; that is what a breed is.

The thing I wanted to emphasize most about this definition is the distinctive character, and to them I want to call your attention. I have heard men say on several occasions that, to confine my remarks now to draft horses, that they would not breed to anything but horses of a certain breed in that same breed, and I have heard other men just as positively say that they would not breed to a horse of a particular breed under any circumstances. Now that is the kind of breed sentiments that I would like to break down. Partisan spirit is a good thing, competition makes for healthy rivalry that gets good results. But when a man is so partisan that he will take a position of that sort, he is not an intelligent, constructive breeder and he has missed the fundamental essential; and that is what I am trying to emphasize. On the other hand I have heard men say that breed didn't count very much, didn't figure much with them, they wanted to breed to the good horse. Now there are good horses in every breed, and that man's position is much more tenable than the position of the other two men, unless it be qualified by certain local conditions which affect the different breeds. I would always rather breed to the best horse, irrespective of his breed, than take a stand that I would not breed to a horse of one breed or to a horse of any other breed.

What are the distinctive characters, which are the things that distinguish one group from another, the result of certain agencies that have been transmitted in the history of the breed and which they themselves are going to transmit to future generations of this breed? They are the things that have to work out of the breed; they are working out to produce a certain class of market horses. The buyer, nine times out of ten, pays no attention to breed, he buys on contract, he has certain specifications to meet. Maybe when he gets his carload of horses together, you and I who know breed will go over them and say they are all Belgians or Percherons. How does it happen that they are so uniform? Because he has been after a certain type of horse and the specifications he was trying to meet have been the specifications that were most in line with the distinctive characters of this particular breed, and as a natural matter of course, the horses he got together will be of that breed; nine times out of ten that is about as much a figure as breed cuts with the ordinary buyer. But say we want to fulfill a contract or a near market demands a certain kind of horse and we are laying our lines to produce it in the future; that is the time to look at the breed in a non-partisan intelligent way.

There are certain horse characteristics we want to produce in future generations and you cannot get anything out of a breed that has not been put there any more than you can get an element of plant food out of your soil that has not been put there if it was not there in the beginning; and yet I have known lots of horse breeders who were endeavoring to get something out of their breed of horses that had never been put there and the reason they did it was that they did not know what had been put in and, therefore, did not know what they could get out and were getting a good many things they did not expect and could not account for and were failing to get a good many things they had set out to get. Now I say that the distinctive characters are the result of definite agencies that have been operating all down through the history of this breed, and you can put them in three groups: First, everything that comes in the line of foundation stock, original blood. Some breeds owe almost all their distinctive characters to the blood on which that breed was founded. The original stock has been very little altered as it has been bred on down in generation after generation. In the second place, we may have the operation of environment so that the characteristics of that original stock have been almost completely lost and new ones introduced either in whole or in part through the influence of environment; and then third, and I think most important of all, and of course involving the other two to a certain extent, is selection. The purpose of the breeder, the ideal of the breeder, the standard that he has had in mind all through these different generations, during which he has been moulding and creating new forms and types.

Now I will show you two pictures a little later of representatives of two breeds, and I think the whole difference between them can be accounted for in that way, it is the main factor. They are practically identical in blood, so far as the foundation is concerned; there has been no admixture in either breed of recent date and comparatively little difference in their environment, and yet to-day they are as unlike as two different horses can be, and the reason for that unlikeness is the fact that the breeders of one breed have had one ideal of what a draft horse ought to be and the breeders of the other breed, another idea; so these are the agencies that have operated, and as we work with our breeds, let us bear this in mind, let us remember that that horse is not an individual; that is an important thing to remember.

When we study the individual, the first thing to take into consideration is whether or not he is a representative of his race. The man who says he would not breed to anything but a Percheron horse, may find the only Percheron horse available a very inferior individual, while there may be available a Belgian horse that stands away up as a representative of his breed, and yet a man will tell me he would not go to that horse because he is a Belgian. The first thing to consider is whether or not the individuals available to us are representatives of their race, because the individual, male or female, does not transmit merely his or her own characteristics but all the characteristics of their ancestors. Now if they are better than the average of their ancestors, you know what the effect on the offspring will be—their colts won't be as good as they are. Why? Because their ancestry is pulling them down, they have shot ahead of their ancestry a little bit, and yet there is the drag of the race pulling them back to this common level; the average of the offspring always represents the average of the ancestors; if you have just an average individual, he represents the average of his race and you are safe in assuming that the average of his get will be just about like him. If you have got an individual that stands away higher than the average of his breed, then you can hardly expect his colt to be as good as he is. If, on the other hand, you have an individual away below the average of his race and he is pure bred and has strong limbed, fast ancestors behind him, you may expect those ancestors to help boost his offspring up to a little higher level than he himself is.

A Member: Can you say a word about the Mendel Law.

DR. GAY: Well now, Mendel's Law has not been demonstrated very clearly yet on horses. Mendel's Law has thrown a lot more light on the subject of plant breeding and the breeding of rabbits and guinea pigs than on horses and cattle; they have demonstrated that the color of horses comes under Mendel's Law and the horn and whole character of cattle comes under Mendel's Law.

A Member: It doesn't run clear through?

DR. GAY: No, it does not hold in all cases, and we don't know yet in which cases it holds and in which it does not; it is a pretty deep subject to attempt. The thing to consider then is whether or not we have an average individual and bear in mind that that horse is transmitting, not his own character but the character of his ancestors behind him.

A Member: We have a black mare that has a bay colt, just like, in shape and color, the dam of the sire.

DR. GAY: Well, now, when you get into color in horses, you have got a very wide range of variation to deal with, in the first place, and almost any color will come along. But this much has been proven; the experiment station has issued a bulletin; Mr. A. B. Cox, a breeder of trotters in Philadelphia, has given a great deal of study to this thing and has also done some work along this line and has demonstrated the recessive and dominant character under Mendel's Law that a chestnut color is recessive, and any time you breed a chestnut horse to a chestnut horse, you get a pure chestnut. If you breed a roan to any other color, in nine times out of ten you get a roan. Old Jaybird proves that; two or three generations removed from Old Jaybird, he is a roan because roan is a dominant character and blocks out the other. What I want to impress on you is the fact that we cannot find out all the characters inherent in the individual by looking at him; he does not manifest in his physical make-up everything he has inherited from his ancestors; he only inherits the characters that are dominant and has a lot of recessive characters, yet he will transmit them just as regularly to his offspring as the characters he himself manifests. How are you going to know, unless you should study their ancestry and see what the foundation blood was and how much it has been modified and see what the breeder himself has had to do not only in improving but in shaping the type?

My purpose to-night is to show you representatives of the four great draft breeds and to try to point out in those representatives the distinctive characters that each breed posseses by virtue of one or more of the three agencies; and then lead you to see, on account of the fact that he possesses those distinctive characters as a matter of natural consequence in heredity, those are the characters he must be expected to transmit. I am not talking about pure breeds except from the sire's point of view; I am talking about the parentage of your pure bred farm horse with your farm mares for market geldings. The first slide I will show you has a lot of statistics which I won't expect you to remember, but there are two or three things. In the first place, it shows the position of Pennsylvania as a horse breeding state. The ten leading horse breeding states are arranged in order. These figures have been compiled by Wayne Dinsmore, Secretary of the Percheron Society of America. Naturally they are colored a little stronger in Percheron figures, but nevertheless the figures don't lie, they are facts. In the first place, you notice what he says at the top, horse breeding shows improvement, the grades are decreasing and pure bred sires are on the increase. That is generally true, but not of the whole country, especially in this State we have not increased very much in the total number of stallions licensed, but we have increased very materially in the number of pure breds in reference to the number of grades, and he finds that to be true all the way through.

The states are arranged here as they stand: Illinois first, Iowa second, etc. The main thing I wanted to point out here is, what I called your attention to in the first place, our dearth of pure bred sires. This table shows the number of horses; that means mares or gelding or anything else. Take the total census of the horses in the state, then take the census of pure bred sires in the state. Now Iowa is the lowest; in other words, it is the highest; they have 276 horses per pure bred sire; that is, for every 276 horses in the state they have a pure bred stallion. We have a pure bred stallion for every 880. I think, I am not sure, but I think it is very much lower than Iowa which shows you that we have, as I said in the first place, a dearth of pure bred sires and it behooves us to make the most of every one that we have. Now we say that a pure bred representative possesses distinctive characteristics not common to other members of the same species to which he belongs.

There is, however, one thing they possess in common; all the representatives of the breed must first of all be draft horses, Now the distinctive characteristics are over and above that, fundamental characteristics are, you will find that in all our breeds there is this fundamental characteristic; we have four great beef breeds, some are black, some red and white, some red and white and roan, but they are first of all beef breed cattle; we have four great dairy breeds; some are colored one way and some another, but every one of them is a dairy cow before she is anything else; and so it is in draft horses; they must first of all be draft horses. This is not only a representative of a breed but he is a representative of a draft horse, and I admit that a draft horse is not as much in order in this part of the State as in the east; that is, I mean by that we have to emphasize draft horses down there because the breeders don't know so much about the draft type. I know that Crawford and Mercer counties are the two great draft horse counties of this Commonwealth, so we don't have to explain a draft horse to the natives of this corner of the State; but down in our corner, they are brought up with a light legged horse in their minds. Here is a draft horse of standard weight close to 2,500 pounds and there is not an overgrown thing about him. You see he is low down and wide out; he is compact, he is deep, he has got the muscleing, he has the bone and if you could see him move, he has got the power in his way of going; he just looks as though he'd pull the corner out from under a house. So that in our draft horse standards, they must have the scale, they must have the substance; while this horse has some fetter there, he has a wonderful quantity of bone in addition to the fetter. You can see it is not beef that gives him his 2,400 lbs. weight, but the way he is made.

All those breeds must conform to the standard, first of all; some conform more closely than others; others depart a little bit from the extreme draft standard. While we have him on the screen, I will say that he is not only a draft horse but he represents the draftiest of all the draft breeds, namely, the Shire. This stallion sold for $12,000 and is supposed to be the best Shire horse shown in this country, and he has won prizes in England before he came here. I have heard men say they wouldn't breed to a Shire. I would breed to a Shire; I would consider it a privilege to breed to this horse and would pay a good big fee to do it and buy a lot of horses of the other breeds to get to him if possible. The characteristics we want to seek in the Shire breed, that we get in the Shire breed, and we don't want to go to a Shire if we don't want those characteristics, are first of all, scale; there is no other horse that will average as great a weight as representatives of the Shire breed, or as much bone and substance and muscleing as the Shire. There is no breed but one that will average as massive and drafty a body as the Shire. If we want those things we must go to the Shire to get them. But every breed has certain characteristics, characteristics not as desirable as those I have named, and it is as essential that a breeder shall know the undesirable characteristics as the desirable; and it is only when a breeder recognizes one as well as the other that he can begin to improve them along the desirable lines, but just as long as a man thinks the stock he is producing is all right, that man is going downhill instead of up, but it is the man all the time on the lookout for the little defects and trying to stop them who is the man that is all the time raising the standard and getting up.

Now grossness in size and quality do not go together; it is a good deal easier to get a pony well shaped than it is to get a horse that weighs 2,400 pounds. When we take his great weight and scale as fundamental, then we have got to make some concession and must expect him to be a little plainer perhaps in the head; although this horse is especially good in that respect, we have got to have some better. I learned that lesson in Crawford county and never have forgotten it. A man brought a Shire horse he had just bought to show to a number of us and he was a very ordinary looking two-year-old but did have pretty good bone. One man says "Why did you buy that colt?" He says, "I wanted bone." He was a very hairy legged horse and another man took exception to that hair, and another says, "You can't get bone without a bit of fetter." That happened to hit me and I have kept it in mind and made my observations along that line ever since. I admit that a nice clean legged horse looks better, but I am absolutely certain of the statement that you cannot get the bone without a certain amount of fetter, and rather than have the absence of bone and what goes with it, I'd get the fetter and get it fine. I don't want these great big shaggy legs, but nice fine fetter on a draft horse makes him look as if he had timber under him, and the draft horse men who know this and know the game best are the men who don't take that fetter off their legs, so you have got to expect a little grossness in a horse of this kind, you have got to look out and see that you get all bone and no quality otherwise. He is the horse that gives us our scale and draftiness and it has been demonstrated very well on the Chicago market that the highest class of geldings, as they run, especially those that range around a ton, have got a dash of Shire in them, the majority on the dam side. James Johnson calls attention to the fact that a great deal of the credit that ought to be going to Shire horses because the Shire blood comes through the dam side is being given to Percheron and Belgian and Clydesdale horses because they happen to be the sires of these horses, and yet anybody can go back and read Shire blood that came through the dam side, and if we knew more about them, we would be attaching more importance to the Shire blood in their ancestors, so dont' turn against a Shire simply because he is a Shire.

I will show you the pictures of two breeds that represent practically the same foundation stock and almost the same conditions of environment, but two extremely different ideals on the part of their breeders. Here is a representative Clydesdale. If you want scale, bone, extreme draftiness and all those things, don't go to the Clydesdale for it, the Scotchman's idea of the draft-horse is a horse that can go away with a straight, friction-less, springy stride with considerable length. That is fundamental to the draft horse. The Englishman's idea of a draft horse is grossness, hulk, bulk, scale, and he sacrifices anything else to get it. In order to get this straight stride that the Scotchman is so insistent upon, the horse would be longer legged to give him more freedom of stride and will have to have a little more range in body. Also, it won't be as thick, because, by the law of correllation a short horse, short in legs is short all over, and a long horse long in legs, is long all over, but he would rather have him a little narow and go straight than have a wide front and roll as these great big massive horses do, and then he wants him to hit the ground in a springy fashion and go with his hocks under him and close together, therefore he has a hind leg that is set more accurately; there is more mechanical perfection in the hind leg of a Clyde horse than any other horse.

I will show you some grades gotten by horses of these different breeds, and from them you can gain some idea of how their hereditary characters are transmitted. Here is a great Clydesdale; this is not characteristic of the breed; some of the Clydes carry the slope of the pasterns to too great an extent. Here is a horse that stands a little low on his knees and he has a foot that is alleged to be representative of this breed, and the feature of his foot, the worst one, is the one that is usually mentioned last, but you see here that same lofty carriage of head and neck; the neck has some space to it, so there is place for a shoulder. We have a pair of Clydes here in harness, showing the same general character. See how they stand on their pasterns, how springy they are, how their hocks are close together how straight they are. That is a long length of neck they have got in front of the collar. A Scotch collar like that will cover up almost the neck of some draft horses, and you can see by the way they stand that they will go off in that snappy, springy easy stride that the Scotchman is so insistent upon. Here is a stallion of a breed more familiar to us. I don't know that you noticed it on Mr. Dinsmore's chart, but there are more Percheron horses in this country than all other breeds combined, and more in this State than all others; they outnumber the other breeds three to one, on an average. Of course that is the real reason why Mr. Dinsmore got together the figures I showed you first, but he introduced incidentally the other figures which meant more to us at the time. Here is a breed that owes a lot to the foundation and I do not want to detract one bit from the credit that belongs to the Frenchman for the production of this almost universal draft horse; but on the other hand we must see in this horse certain characteristics that go right back to his foundation blood, and much less altered by man's tampering than in the case of the other two breeds I have shown you.

Here is a horse that has his foundation away back in early times, in the first place, in the so-called Flanders horse, a horse of cold blood, characterized by his bulk and coarseness, his black color, the amount of hair he develops on his legs, tufts at his knee, tufts at the point of his hocks and even a mustache at his lips; very slow and awkward in his movements. That was the foundation. On that top course, first, accidentally and afterward with malice aforethought, were made infusions of color through blood. The accidental way in which that occurred was in consequence of invasion back in the days of the Saracen invasion, the barbarians came north into France and were overpowered and their mounts, which were largely stallions, fell into the hands of the victors and were distributed among the French soldiers and taken back into the country and became the leaven in the horse stock of that country. The Crusaders accomplished the same thing, and after that, when the influence of this blood was demonstrated, systematic importations of oriental blood were made into France and while there are no oriental stallions close up in the pedigrees of our Percherons today, if you go back you will find they go back to Jean La Blanc. This horse has a finer breed of head than any draft horse, finer ears, a fuller, clearer eye, more sharp definition of features. We see it in his disposition and temperament. He is active, snappy. We see it in the character of his bones. The trouble with the Percheron bone, nine times out of ten, is that there is not enough of it, it is too fine, and we see it in the character of his hoof. He has got a hoof that comes from the hot blooded horse.

And, finally, what can he do. The Percheron horses are the most versatile, they can do the greatest variety of things, and there are a great variety of types running through them. The old fashioned Percheron horse is a general purpose horse. If you could see some of these old fashioned Percherons, or pictures of them, I think you would find your ideal for the general purpose horse, but when the demand came for bigger horses, they had to put more cold blood into this stock and bring up the size and scale, but they have done that very skillfully and have retained the features of the old oriental stock. So here is a breed that, while he owes a lot to the men who have bred him, we can still trace his ancestry in the general characteristics he manifests to us to-day.

Why is the Percheron horse more numerous in this country than all other breeds combined? Is it because he had the earliest start? No, it is because he made the first hit; he was the horse that the farmer took up as the one thing that suited him in the way of a horse, and from way back in 1851, the days of Louis Napoleon, until to-day, the Percheron horse has received the stamp of approval of the farmer. This is the reason—he is a versatile horse, he can do anything, and the Percheron stallion is just as versatile a breeder as the Percheron horse is a performer. You breed a Percheron stallion to almost any kind of a mare and you will get a market horse of some sort. If he is spotted with light hairs, he will make a snappy, active draft horse; if lighter yet, he will make an express horse with a good long stride that can step away with a load. I have seen some half breed Percherons that could go up as high as any coach horse and I have seen some hunters that could endure as long as the hounds ran, and once in a while you will find a Percheron that can step better than a four minute lope. He is versatile, fits in all around, and that is the reason we find him so popular in this country. This is the little horse that has been spoken of so many times and is shown in another picture, in the lead of this type that I refer to. That shows you the ideal to be sought when mating mares to a Percheron stallion. I say he will get a marketable colt out of most any kind of a mare, but you want to give him a chance and give him the best kind of a mare and then you can expect to get something of this sort.

A Member: I observe in the cities that some of the better grades of Percherons are of a gray color; is there anything to show that the gray Percheron is a better horse than the black Percheron?

DR. GAY: Well, there is ample evidence to show that the gray Percheron geldings on the city streets is a lot better horse than the black. In the first place, there is no doubt that the gray horse does not feel the heat as much as a black horse does. Take a lot of soil, put lamp black on part of it and something white on the other part and stick a thermometer down on each one and see which registers the highest.

A Member: But you take a horse on the street that appears to walk along easier even at this time of the year, when the heat is not a factor.

DR. GAY: You take Wanamaker's stables in Philadelphia; they won't buy anything but a gray horse. That is one reason. Another reason is that they can match up their pairs. Take a bay horse and nine times out of ten it has a mark on him and especially if you are putting three or six together, and they blend better with the ordinary red and yellow or green color of a wagon on the street, and it is more easy to get an even shade of grays than any other color, and they want that uniform color throughout their stables and find they can get it more easily in grays than any other colors. Swift first told me that they pay $25. or $50. more any time for a gray horse than any other.

A Member: Some think that a gray stallion is better than a black stallion; is that a fact?

DR. GAY: They used to tell us that a black stallion would get more gray geldings out of the average run of mares than a gray stallion would, but I don't think that is so, I think the gray will get more, but on the streets certainly more favor is shown to a gray horse than a black one.

A Member: How did they get that increased size in Percherons for the last 24 years?

DR. GAY: By going back to more of the old Norman blood; they have increased the percentage of that, yet they have skillfully retained the characteristics of the hunt blood.

A Member: It is not quite the same tempered horse.

DR. GAY: He is a colder horse to-day than he was 25 years ago. There is no question about that, and it is only due to their care in selection that he is not colder than he is. There is a nice pair of farm horses that have won prizes in all parts of the country and show every evidence of Percheron breeding. Here is a horse that has won prize after prize at Philadelphia workhorse parades, and isn't he a Percheron? He has the earmarks all over, although you see he is a draft horse but the product of a Percheron sire, probably the old fashioned sort, lighter, snappier, joined on probably to a good stout mare. Here is a representative of the fourth breed, a breed that by the way is showing a greater percentage of increase than any other breed in this State, and I think that is true the country over.

The breed of course has had a serious set-back on account of the war. We don't know just what we will do in the future for Belgian horses. We in this State I guess will depend on our Crawford and Mercer county breeders. Here is a breed that descends even more directly than the Shire from the old Flanders horse I have referred to. In the first place he is rather cold, he don't show the characteristic breeding about the head that the Percheron did, but he does not show the great development of hair that was characteristic of the old Flanders horses; he is a clean-legged horse as far as we can have him clean legged, yet he has bone enough to be in the draft class. What are the essentials of this breed? They are more environment than foundation stock. You have high hips from here back and from here up; that is, take the head and neck and legs and feet off a Belgian horse and I think we are safe in conceding that he will beat the world. There is no horse draftier in his body. You remember I said the Shire was the draftiest bar one; this is the one. There is no horse so compact, wide and deep as a Belgian unless it be a Shire; and wonderful ribs; but there are some things associated with that we have always to guard against. With this extremely short back we like so well in draft horses, we are always going to get a neck correspondingly short. If his neck is too short, it will have the same shape as a hog's neck, and where are you going to put a collar? A horse has got to have some shape to his neck to have a good collar. In the same way the extremely short body oftentimes gives us a very short leg that has a rather sturdy pastern with it. Don't understand me as complaining about the features of this breed.

I neglected to mention the heel of the Percheron. Those who did not like the feet of a Clyde horse, how do you like the hind legs of a Percheron horse? If the Percheron breeders don't do something to improve the hind leg of their breed, they are going to suffer the same as the Chester hog breeders did in Iowa. The breed was so popular that every white hog was called a Chester White, with the result that the breed itself fell into disrepute.

A Member: How do you like the forelegs of a Belgian horse?

DR. GAY: If he has got pastern enough, I like him all right.

A Member: What about his small knee? Can he pick himself up any?

DR. GAY: I say the best part of the Belgian horse is from here up and from there back and within those limits he is a pretty hard horse to beat. But when you consider the wonderful improvement wrought in the last 15 years, you have great hopes for the future.

Here is the proposition; what kind of mares are you going to breed to a Shire horse? What kind of mares are you going to breed to a Clyde? What kind to a Percheron? What kind to a Belgian? You will find that the Belgian horse will give you drafty bodies on colts out of the average run of mares we have in the east that carry a predominance of trotting blood, quicker perhaps than any other breed. You understand you cannot cross a cold blooded horse on a hot blooded horse; the more extreme your crosses, the more variation you get and as a result you come to a head-on collision; they simply stand at loggerheads; but on the other hand, if you can take a mare that is not too hot blooded and a Belgian horse that is not too cold blooded and make the mating there, I think you will find that you will get a better, draftier shape and form from a Belgian than a stallion of any other breed, on an average. The criticism of the Belgian is that he is cold, lacks quality, is not good in the face and legs. Our trotters will give him enough quality and enough refinement about the head and neck and enough bone in the legs and he will give them the body, the point at which they are most markedly deficient. Here is a pair of Belgians of Belgian breed.

A Member: Would you then cross a heavy Belgian or trotting mare with a Belgian sire?

DR. GAY: No, I say you cannot make two extremes a cross; you cannot take one of a straight hot breed and one cold breed and mate them, because you are liable to get a Belgian head and maybe a trotting horse body, and Belgian legs and trotter's feet. They have got to be somewhere nearly approaching; but what I mean is that where you have comparatively draft mares but averaging light waisted, leggy and want their form improved in draft lines, that is the class of mare that the Belgian horse will do the most good on. These are Belgian. They have the characteristic red color. They don't stand quite as nice on their legs as the Percherons or the Clydes that you saw in the other picture, but they have the form and shape. These are Percherons again, the same as I showed you in the first place.

In conclusion, let me just simply say this; when we talk about breeds, don't take the same stand on breeds that you take on politics—what we call voting on principle. Don't vote for a Percheron horse simply because he is a Percheron horse, but make him be a good one before you vote for him, and when it comes to a choice between a horse of definite breed or one by different lots of stallions, take the best horse regardless of breed and I think you are safer than you are to follow out this partisan breed sentiment that so many people express.

THE PENNSYLVANIA EXPERIMENT STATION, ITS WORK AND LESSONS

PROF. R. L. WATTS, *Dean Experiment Station, State College, Pa.*

Mr. Chairman, Ladies and Gentlemen; Friends and Farmers' Institute Workers: Some time ago I was told a story of a boy who had been given a very large toad as a pet and he kept his toad out in the yard where he could see it every day. A great many things about the toad interested the boy; but the thing that interested him most was the great variety of food the toad would eat. He took out little crumbs of bread; he would catch bugs and flies and even give the toad little pieces of tobacco sometimes. It seemed to eat everything with relish, and one day he found a very large, fuzzy, wooly worm and was wondering whether the toad would eat that worm. He took it out and the toad ate the worm and seemed to enjoy it. Later in the day he thought he would go back and see how the toad was, and he went and found the toad on its back with its feet sticking straight up into the air, tickled to death. Now that is about the way I feel when I come before an audience of friends, institute workers, I might say co-workers, because I have worked with many of you at the Farmers' Institute. I am afraid though that instead of being "tickled to death" to-night you are just about frozen to death and I am going to make my remarks very brief.

I have quite a number of pictures, but we will pass them through rapidly. The longer I live the more impressed I am with the fact that successful farming depends very largely upon the application of correct principles, that if you do not apply correct principles, your farming will not be successful. In other words, if you don't know that a thing is right when you do it, the chances are that your attempt will be a failure. I am going to illustrate that point by referring to a few personal experiences. One time I was down in Washington county, or Greene, I have forgotten which, attending a Farmers' Institute, and at the close of the afternoon session a farmer invited me to inspect his orchard. I went with him in his buggy to the orchard two or three miles distant, looked over the trees and made this remark; I said, "I believe that the thing that will help your orchard more than anything else is a liberal application of stable manure." I have never forgotten how the farmer was shocked by that statement. "What? Stable manure in an orchard?" "Oh," he said, "I don't agree with you at all." I said, "All right, you don't need to, but that's my judgment." Now I don't know that that was the thing that his orchard needed, but I thought it was the thing he should do to that orchard. Now if that same man or other men should ask me the question concerning an old orchard that was starved to death, I would say without doubt that that is a thing that should be done. Why should I say that with such conviction? Because our own experiment station, your experiment station at State College, has found, by experimentation on a large scale on different soil, types that there are many cases where a liberal application of stable manure will do an orchard more good than anything else, and my answer to that man was probably guessing, because we did not have data at that time which showed conclusively that that was a thing which should be done.

Let me give you another case; suppose a farmer or fruit grower fifteen years ago, when I attended a great many Farmers' Institutes in Pennsylvania—suppose that a farmer should ask me this question: What formula would you recommend for an orchard in bearing? What kind of an answer would I have given? Well I would have probably said this, "It is possible that you could use a fertilizer that would contain 4% of nitrogen, but it is unlikely, because nitrogen tends to develop growth, foliage, instead of fruit, and therefore I would be a little careful about that nitrogen; it is possible that only two or three per cent. will be enough; put on 8% of phosphoric acid, but potash is a thing all our fruit need, so put in 10% potash." Now what would I tell an orchardist in this State who has bearing trees? Would I give him that kind of an answer? Not at all; I should say, "We have found in our experiments, harvesting thousands and thousands of bushels of apples every year, that it is not potash that determines the fruiting qualities of an orchard, but it is nitrogen. We have found on twelve different soil types, that nitrogen has more to do with a big crop of fruit than potash." I suppose Dr. Stuart might say, "Use 6% of nitrogen, 8% of phosphoric acid;" and under certain conditions I think he would drop the percentage of potash to four instead of ten. What would cause him to give an answer of that kind? Why, the harvesting and the weighing and measuring of thousands of bushels of apples that have been harvested from orchards where he is making experiments.

Now when we must know the truth in farming if we want to win out as a business proposition, and that is why we have in this State today and in every other state of the Union an experiment station to find out what is the truth with reference to the use of fertilizers and spraying material and foods and everything of this kind. We don't want to be guessing, farmers; we want to know what is right when we do things on the farm, and, therefore, Congress has been very wise in making rather liberal appropriations for experiment stations in different states of the Union. Now to-night it would be useless for me to attempt to give you very many lessons from the experiments at State College so that I have decided to show you rather a large number of pictures—in fact you will think this is a sort of "movies" to-night by the time I am through—that will show you the kind of work that we are doing at State College along experimental lines rather than the exact lessons that might be drawn from these numerous experiments. I want to say here at the outset that we are conducting three or four hundred different experimental projects and that we stand ready at all times to give farmers and friends and lecturers information concerning the results of these experiments which are conducted with fertilizers, livestock, horticultural crops, fruits and vegetables along almost every line.

Now if we have the light we will show some of these pictures. The college operates about 1,500 acres of land on which this experimental work is conducted, much of it, and where we provide feed for our stock. Before taking up the experiment station work, I thought you would be interested in seeing a few general views showing the college. This is the main building, the first put up on the campus. This is one of the oldest buildings on the campus, the armory, used more largely now as a gymnasium, showing attractive plannings around the building. This shows what it looks like on the campus sometimes during the winter. You will see here also the character of the trees on the campus. We have a great many fine specimens of various kinds of evergreens and similar trees. There is the Norway spruce, heavily loaded with snow. It seldom breaks with a heavy load of snow, which cannot be said of many of our trees. This shows the agricultural building, which was the second of the new buildings, the newer buildings on Agricultural Hill. Over here to the right is the old experiment station. Here we have a picture of the new horticultural building which was completed last year and is perhaps the best single horticultural building in the United States to-day, completed at a cost of $120,000. That shows the entire student body assembled in front of the auditorium. The enrollment of the college is now about 3,300. Eight hundred of this number were summer school students. This shows the growth of the enrollment of students in the School of Agriculture. Back here in 1904-05 we had only 73 students; the next year we had 94, the next 111, the next 202, and so on, and this year we have 1,237.

I want you to note one thing about this chart showing the enrollment of agricultural students, and that is that this line is decidedly shorter than that. We enrolled fewer students last year proportionately than the year before. Do you want to know the reason for that? Simply because the college was forced to refuse admission to several hundred students because of lack of class room and laboratory facilities; everything was filled and we were unable to take care of more students. I hope that condition will not exist at State College very long, because one of the hardest things we have to do is to turn away farm boys who have saved money to take a course of study and send them home again because we haven't room for them. They seldom return to the college to take the course.

A. Member: How many farm boys are in the enrollment now?

PROF. WATTS: I cannot tell you exactly. The courses in agriculture seem to be attracting more students right now from towns and cities than from the farms. It has been said that the farmers' boys take engineering and the city boys take agriculture. I dont think that is likely, though I suppose we have in agriculture five or six hundred students to-day. That point is exceedingly interesting. Some have said that those city boys will not make good on the farm. If the city boy makes good in his college course, if he stays there long enough to complete a college course and acquires in addition to his technical training practical experience, the city boy will win.

If I had time I would tell you about a good many city boys who have become farmers, gone into various lines of agricultural pursuits and are making good. It is simply a matter of whether he has the practical experience or not. This shows a football game among the students on the college campus. Whether it is of value from a military standpoint, it is an excellent thing for the students to have this military training of two years; it gives them better carriage, teaches obedience and has a distinct value. This shows the exhibit made at the county fairs every fall; we have it in duplicate and show it at a number of the fairs every fall. That shows the farmers at Farmers Week. Last year or perhaps the year before we had something over a thousand people at Farmers' Week. It is always held between Christmas and New Year Day. Here we have a rear view of the Dairy Building. Most of you know that the college operates a commercial creamery placed in this building. Several hundred farmers send milk or cream to the dairy building; it is open to admit all kinds of dairy products, cheese, butter, ice cream and so forth, and much of this work is done by students, so it is a commercial proposition and gives our students actual practice in working up dairy products. You have heard probably of the new dairy barn which was completed last summer, and many people say this is the best looking and most popular building on the campus. It was completed at a cost of something more than $30,000. There is one statement I hadn't thought of making at this time, but I think it is right you should have it; the legislature appropriated $20,000 for this barn, and from the earnings of the college farm and of the creamery, we were able to put more than $10,000 into this building, so that we have a structure there of over $30,000. There are some features about this building that perhaps will interest you. We have two large silos, one at either end of the barn. One is built of hollow tile with stucco finish; the other of concrete with stucco finish. You will notice there is no barn floor such as they have in most barns. About half of the building is used for the storage of hay. Last summer we had 100 tons of hay stored at this end of the barn; over here we have our feed rooms, students' rooms and other rooms necessary in structural work.

The next few slides will show this barn. On the side here is a milk room and you can see the large number of windows all along the side of the room. Here you will see more details of the construction of this stucco over the end of the barn and along the side about four feet of the base of the barn is brick. This is the interior of the yard enclosed on three sides; a very cosy, sunny place for cattle, in the winter time. We think we have the best barn in the United States, considering the size and type of construction, and it was put up at a very low cost.

A Member: What is the size of it?

PROF. WATTS: I don't believe I can give you the dimensions of that barn. Is there anyone here from State College who remembers the dimensions? It is a large barn. Here we have the interior view. You will notice that the cattle face each other. The feed is taken down here on the cart and delivered along in front of the cattle. Then the manure is taken from the stable around the side. You will notice the carrier. One of the best lines of work that is being done in the dairy department is the judging of butter. Butter is sent in from all over the State, from creameries and farms and individuals, and it is scored and the results sent back to them. It is a line of work which has been very productive for good. I want to show you two animals.

All the pictures you will see of animals to-night represent cattle or stock on the college farm. We have here an Ayrshire cow which is a very good specimen. Here is a Guernsey of the college herd. We are attempting to build up four herds of the leading dairy breeds. We have here the Jerseys. I am sorry to say that we haven't anything to show to-night of the Holstein. Here are some of the Jersey cattle on pasture near the Experiment Station. A large part of the college farm is used for pasture purposes. Here are some Jersey calves. Here's the Ayrshire bull which heads the herd. Now in our cow testing association work, which is growing and is growing in importance, this is one of the cattle, one of the cows, which was found—a very poor animal, as you will see, and the next picture will show you a profitable animal. There is no question about the fact that there are hundreds and hundreds of cows in Pennsylvania farms that are simply boarders, not paying any profit at all.

I want to show you a few views of the horticultural department. Here is some intensive work in gardening and overhead lines of irrigation. There is something that I think every farmer and villager who has access to water at a pressure of 15 pounds or more should provide at least for the home garden. It certainly makes production much more certain in commercial gardens and adds to the profits of the business. This shows a lot of seedlings of cabbage, showing how much stronger some varieties are in germination than others. Mr. Myers, of the Department of Horticulture, has been making a study of strains of cabbage for a good many years. When I grew cabbage some years ago, I thought the only thing to do was to buy seed of a certain seedsman because I considered him reliable and thought he had the best seed. I want to acknowledge that to-night, because I used seed from a certain house. The probabilities are that I lost $50. or $100. an acre some years because that was not the best grade of cabbage. This is a row of cabbage from seed gotten from one of the best seedsmen, which is decidedly leafy. This is very much smaller, while that will not approach this variety or strain in ability to make money. This shows a view of the entire field, or part of it, in the cabbage work. Now the next picture shows the great difference in maturity; that row of cabbage remains while this row has been cut out. That row was cut out and sent to market and brought high prices, while by the time this row was ready, the prices were down. Some of these strains have been making a hundred dollars more to the acre than another of the same variety, and if you can buy or produce seeds that will make $100. or even $25. more to the acre than an inferior strain, it is certainly well worth taking into account. That shows a plant grown from seed bought from one of the most reliable seedsmen in the country, a leafy type with a very shall head. Note the difference; there we have a conical had; it is hard, goes to market at a high price and pleases the consumer. Both are Jersey Wakefields. These strains of cabbages, tomatoes and other vegetables vary tremendously in their earnings and their yielding power. It is all Jersey Wakefield cabbage, but a different line of each variety. The black line represents the first type.

Note here that this variety or that strain cut only two-tenths of a ton the first time they made the cutting, while down here this line cuts four and a half tons at the first cutting. Suppose we are getting $50. or $60. for cabbage the first cutting—see what a tremendous difference it makes. This strain yielded only 4.1 tons of Jersey Wakefield, which does not produce high to the acre, while there are other strains that ran 8½ tons to the acre. You will note a great difference in the yielding power of different strains, showing the importance of good seed. The same thing is true of the tomato to a less extent. The black lines represent the tomatoes harvested up to August 13th, while the long lines represent the total yield. This strain yielded a little more than half as many tomatoes as this strain. Suppose you are growing tomatoes for the canner for which you are getting $10. a ton; you have a strain that produces 12 or 15 tons of tomatoes to the acre, say 15, which is not an unusual thing. We have many strains at State College which are running 15 tons to the acre. That means $150. to the acre. Suppose you have other strains that produce only 10, that would be $100. to the acre—quite a difference. There are wonderful possibilities from using better seed on Pennsylvania farms, not only in market gardening but in general farming as you will see later from some pictures.

This is an interesting picture showing the influence of soil in the starting of young plants. This experiment was started just this spring. Most gardeners believe that the thing to do is to mix up a good rich soil for starting the plants. These plants were grown in rich, limestone soil in the greenhouse. I want you to note that these plants are strong, vigorous and healthy. I also want you to see that the root growth is not very strong; the top is all right, the foliage is all right, but the roots, with the exception of that plant, are not very satisfactory. Now note the next picture and see what that looks like. Here we have small plants with long, strong, vigorous roots; these plants were grown in pure sand. Before I started on this trip, I went out to the field where these plants are now growing and noticed that these plants, which are plants with small tops but large root systems, are probably a third larger at this time than these plants grown in a rich loam soil; so the lesson drawn from this experiment, although this is the first year it has been conducted is, that it is not desirable to start planting in soil too rich. The all important thing to accomplish is to produce a strong, vigorous root growth rather than excess of top growth. In our tomato experiment, we found a plant a few years ago which produced tomatoes like these, all cracked and rough, ill shaped tomatoes, and those plants that continued to produce that kind of fruit where no attention was given to selection. On the other hand we have found plants among various varities which were unusual in their fruiting qualities and produced tomatoes like these.

Our truckers are learning that they can make tremendous advancement in their profits and yields by exercising greater care in the selection of seed. The next picture shows the same lesson. Here were two unusually good plants; over here we have harvested from that plant 89.9 pounds of marketable tomatoes; from the plant over there we have marketed 80 pounds of good tomatoes and harvested 6.2 pounds of tomatoes not fit to send to market. Those are unusual yields because they were grown on plants unusual in their profit yielding capacity. A variety of tomato known to everyone is the Masters, a new variety. It appeared 8 or 9 years ago. It is an unusually productive tomato and very satisfactory in most soils. Mr. Miles took the Hummer and crossed it on the Masters and here is what he got. I wish you could see those plants in the field where you can look down on the tomato plants and see 40 or 50 ripe specimens one one plant, where it has not been picked, the first of September, and everyone of them perfectly round, smooth and sizable tomatoes. This shows a crate of tomatoes in the college greenhouse. We have found that the Globe and Bonny Buster were the most satisfactory varieties for growing under glass. Now going out to the fields again, one of the most important experiments we have made is with asparagus and the next picture will show the result of this work. I don't think you can read the figures back there, but I wanted to stop long enough to tell you just what this means. We have made the experiment with two varieties. We made the planting seven years ago and graded the roots into three different sizes, large, medium and small roots. The interesting thing about this experiment is that the small root and small plant that came from those small roots have never caught up with the medium size and that the medium sizes have never caught up to the large ones. Let's look at the returns first. This represents the largest root. We made the first harvest in 1910, and those roots produced at the rate of $160. to the acre. Now, with the medium sized root, the No. 2, the yield or returns were considerably smaller, with one or two exceptions. The first year we got a little more from No. 2 roots, but from there on the No. 2 returns were smaller. Now, you will note down here that on these small roots the showing is still more marked, but you will note that those small roots have never caught up with the large ones. If you want to grow asparagus and want to plant 1,000 roots, grow the 3,000 yourself from selected seed, select 1,000 out of the 3,000 for planting, and your returns will be large.

Now, a little about our orchard experiments. We saw awhile ago that in certain orchards of Pennsylvania, manure can be applied to better advantage than anything else, and in other orchards, commercial fertilizers. In this experiment in Warren county neither money nor effort has made any appreciable showing. In this orchard, which is in Lawrence county, during six years, nitrogen and phosphoric acid has given increased yield, or has given a yield of 305 bushels to the acre. You will note here that those trees on this side have been fertilized with nitrogen and phosphoric acid and those other trees have not been fertilized. These trees are evenly loaded with fruit, while there is practically no fruit on this side. The results have been unusually striking in Lawrence county, showing the value of nitrogen and phosphoric acid. This experiment in Bedford county—the results have been equally striking or practically so. We have harvested 335 bushels in the seventh year, to the acre, showing the result of nitrogen and phosphoric acid. This is a Baldwin tree seven years of age. We topworked it on Northern Spy and at the seventh year picked a bushel and a half from the tree. Now, we wanted to draw out here a few lessons, which I think are of unusual importance to Pennsylvania fruit growers. Between those apple trees we are growing potatoes. In the experimental orchard at State College, on limestone soil we have found out that the apple trees, Baldwins, Stamens, Winesaps and some other varieties, that the apple trees have been growing where we are growing potatoes between the rows, have made 12% better growth than where we have followed the most approved method of orchard management. I mean by that, plowing in the spring, harrowing until midsummer, and then starting a cover crop, plowing that down the following spring, and keeping that up year after year.

Now, that is not all of the story. These potatoes, or beans and peas, as we have used sometimes, have returned from $50. to $75. to the acre. Now, of course, we cannot utilize all the ground, and these figures are very conservative. Limestone soil is not a good potato soil, and having a good potato soil you should do much better, but our returns have been $50. to $75. to the acre. That means that the farmer growing crops between his trees will more than pay for the expense of that orchard while it is coming on and make a profit out of potatoes besides. I am sorry that I cannot show you a part of the orchard showing the trees mulched. The finest apple trees in this young orchard at State College are where we have mulched them every year heavily with straw. Those are the finest trees in the orchard. These trees are better than any other trees, even those where we have gone through the potatoes, where we have planted cover crops. I have to make one exception, where we have grown alfalfa, taken the alfalfa and mulched the trees, we have gotten better growth there than where we have mulched with straw, and that is due to the larger amount of nitrogen added to the trees. We have a cover crop of vetch, one of our best cover crops in Pennsylvania, certainly on limestone soil, where we have been making this experiment. Soy bean is also very good and certainly better on a limestone soil than cow peas.

There is another lesson I want to bring to you; we referred to alfalfa a moment ago as being desirable to grow in young orchards. The best trees in that orchard are where we have grown alfalfa, mulched the trees with alfalfa so heavily, that the moisture is conserved more perfectly than in uncultivated areas. There is one other lesson—it is possible to grow a surplus of alfalfa in that young orchard which can be sold or used as hay; in other words, the growing of alfalfa in the young orchard is worth considering as a business proposition, aside from the growing of strong, vigorous young trees. I think that these are the most important lessons that can be brought from our experimental work with fruit trees. There is a picture showing some experiments with ground rock on peaches. We found that some of the commercial preparations recommended for the spraying of peach trees are decidedly injurious and should be used with great care. The trees must always be protectd from mice. We keep the straw away from the tree a little way, but if you will use wire collars to keep the mice away, it is certainly very successful.

A Member: They get under the protection and eat at the roots.

PROF. WATTS: We have not experienced that trouble at State College so far as the growth is concerned. That certainly is a very satisfactory plan. This general conclusion might be drawn, that that plan of orchard management is best, so far as the tree growth is concerned, which conserves the moisture most perfectly. It is a moisture question very largely. Now for a few pictures. We have here our new stock judging pavilion, which is heated comfortably and used all the year through in the stock judging work. It shows an interior view of the pavilion, with chairs all around and seating capacity for 800 people. We have here a group of cattle used in the feeding experiment. We have found that the most economical ration is silage, and 2½ pounds of cotton seed meal per 1,000 pounds of livestock. That is better than where the cattle are given corn fodder and hay for the range. Silage must enter into the ration if you want to feed beef cattle economically and get the best results. Of course, we use different combinations, but we have one lot every year which receives no other roughage but corn silage and 2½ pounds of cotton seed meal per 1,000 pounds of live weight. Our herd of pure bred breeding cattle is treated in the same way and we are not able, at this time, to see any injurious effects from that kind of roughage, only I think most farmers would prefer mixing in a little clover or alfalfa or some other dry roughage, but the results have been very satisfactory at State College.

This shows a low constructed shed for sheep, very inexpensive, yet one which works out very nicely, built on the south side of one of our barns. This shows one of our Berkshires on a blue grass pasture. We are also making some experiments on the Spring Creek Farm, and here the hogs are having a real good time pasturing on oats and Canada field peas. Now, this looks like a sort of a hoggish trick, to turn the hogs into the corn, but they make a good job in harvesting it, they don't waste very much, and another curious thing is that these hogs made gains a little faster than the hogs where they were fed corn carried to them every day. That plan, of course, is more popular in the West, I presume, than it ever will be in Pennsylvania. This shows some of our sheep pens used for hogs down on the lower farm; they are a sort of portable pen. Here is a herd of some of our steers on Spring Creek Farm; pure bred steers. I want you to note there the character of land, the rough, rolling land. A great deal of this land should not be farmed, though it is not as steep as much of the land which is in tillage in Pennsylvania. We are doing everything we can to encourage the livestock industry. We believe that too much land in Pennsylvania is farmed too intensively, that there are thousands of acres on the steep hillsides that should be put into grass and grazed rather than plowed and farmed in an intensive way.

A Member: Do you ever fertilize that hill land?

PROF. WATTS: We are making some experiments and it responds quickly to the application of commercial fertilizers or manure. We have a field, which, when we bought it three years ago, was very weedy. The weeds have disappeared and it is getting better all the time, but probably it would pay better to fertilize that land with fertilizers or manure and then put cattle in it. I want you to note these cattle which have come down into this stream on a hot summer day; it is a pure stream that comes from the mountains and it is one of the best things we have at State College, this pure stream of water for our livestock. That shows a lot of steers which were being prepared for the International Show. We have one of the younger animals, a very good animal here. This shows our herd of pure Angus. Here you get a better idea of the character of the land. This over here is very steep. That is taken down on the lower part of the farm about three miles away from the college building. They make a beautiful appearance, these black cattle on the pasture. Every one of these cows that you see here had been wintered for several years on corn silage only as their roughage and came out of the barn in the spring fat and round as rolls of butter. Here we have a bull that heads the short horn herd. I want to show you now a couple of pictures of a couple of Herford steers, very nice animals. This is another specimen. We buy a carload of horses almost every winter and conduct a fattening experiment, a feeding experiment on different methods of feeding horses and preparing them for market. This shows some of these animals; they are all western animals and we get some very good ones among them.

A Member: Are the farmers that visit the college grounds allowed to feed cattle?

PROF. WATTS: They are permitted to see the cattle out on the pasture, but we are not allowing them to enter the dairy barn. I don't know just when we will take the quarantine off, but we have so many cattle there and we have kept the record for so many years that we feel we would be taking chances to take the quarantine off the dairy barn. They just had a new outbreak of foot-and-mouth disease in Philadelphia recently and we think we are justified in keeping the quarantine on the new dairy barn.

A Member: In which way can you make the most economical gains on your feeding of stock in winter, in open sheds or barns?

PROF. WATTS: According to our experiments at State College, the use of corn silage only as roughage and then of course as the time approaches to put them on the market, the use of cotton seed meal, if we don't use cotton seed meal, they will have more or less bowel trouble, and this seems to be necessary to maintain the good health of the animals.

A Member: My question was, can you make the greatest gain in open sheds fresh air or when they are confined in a barn.

PROF. WATTS: I did not catch your question. All of these animals are kept in open sheds, we do not believe in confining any of the big beef cattle to closed houses and I doubt whether it is best to keep the dairy cattle in. Our new barn is so well ventilated with windows that it is practically outdoors. I believe experiments have been made which show that even the dairy cattle will do as well in open sheds as in the closed stable, but that is a little out of my line.

I want to show you just two pictures showing the type of work done by the Department of Botany. Here we have the brown rot on the peach and the next tree shows the mumified fruit under the tree. That will be controlled by proper spraying. Now we want to show you a few pictures of the Agronomy Department, then we will be through. You have all heard of the fertilizer plots of

State College having the longest continued fertility experiments of any state in the Union. On the left where you see these three piles of hay, three piles on each plot, over here this plot has received burnt lime at the rate of 4,000 lbs. to the acre every fourth year. That plot has also received 6 tons of manure every year in rotation, a four year rotation. This central plot has received lime only at the rate of 4,000 lbs. to the acre every fourth year, while this plot has received nothing.

These experiments have been in progress for 33 years. We haven't time to stop to draw all the lessons that might be drawn from these experiments. One lesson is that lime in large quantities alone will do no good whatever as a long term proposition. There are former attempts to use lime which show that it does not maintain the supply of organic fertility in the soil. There will be no benefit whatever from it, because the crops on this farm where nothing has been applied for 33 years are practically just as good as on this where lime has been used. We also learn that the use of any fertilizer which keeps the soil in a highly acid condition is undesirable, that the judicious use of fertilizer on this land will maintain fertility and result in crops just as satisfactory as where manure has been used. Now that is a strong statement to make, and yet we can back it up. A few years ago farmers came down and looked over the fertilizer plots and they would go down the alley and look at this plot and say "There is a fine plot; how has it been treated?" "Why, we used manure and lime on that land for 30 or 33 years." Then they would go down and say "Here is a plot that looks just as good, how have you fertilized this?" "We have used commercial fertilizer on this plot." "No manure, no lime?" "No, no lime; nitrate of soda has gone into that plot and helped to keep the soil sweet." Then the farmers would say, "That's all right on a little plot of land but it won't work on a big farm." They used to say that to Dean Hunt, so finally Dean Hunt said, "All right, let's try it out on a big farm;" so he went across the road and rented a farm. We have been farming that land five or six years and I want to say that we are handling that land successfully without manure; there is no manure used on that farm and hasn't been for five or six years. We harvested there year before last over 30 bushels of wheat to the acre, threshed out 37 bushels last year and the fertility is being maintained by the use of commercial fertilizers and lime.

Sometimes we are taken to task for calling attention to this experiment on the Mitchell farm. Last year a banker, very much interested in the development of agriculture in this State said, that we were making a big mistake. I told him we had no right to keep that fact from the farmers of Pennsylvania. While we want to encourage the livestock industry because it is one of our most important things in Pennsylvania, yet every farmer should understand that by the judicious use of lime and fertilizers he can increase the productiveness of his farm and increase his earnings. It does not necessarily mean that Pennsylvania is to abandon the keeping of livestock, but it does mean that every man should study the use of fertilizers and lime and that the productive power of a limestone soil can be maintained by the use of fertilizers and lime.

A Member: Could you produce that wheat at a profit?

PROF. WATTS: Yes, the wheat was produced at a profit. The experiments have not been conducted long enough to answer that question as definitely as I would like to at this time, yet we do hold figures on the comparative cost of production on these fertilizer plots and the manure plots.

A Member: Was any humus injected into that soil?

PROF. WATTS: Only as it came into rotation from the clover that might be left on the ground and from the corn, wheat and oats.

A Member: What is the rotation?

PROF. WATTS: On the farm plots, corn, wheat, clover and oats; on the farm it is wheat, clover and corn.

A Member: In cutting the wheat, did you take any pains to leave lots of the straw while they cut?

PROF. WATTS: No, not at all; cut it in the usual way.

A Member: What kind of lime did you use?

PROF. WATTS: Well, we used different forms of lime; ordinarily just common burnt lime.

There is another man to follow me, so I will have to hurry. I simply want to show you a few samples of corn, unusually fine ears, champion at one of the corn shows; that shows a selection of a number of very good ears; that is a dent variety, I don't know the name. Here is an exceedingly interesting experiment showing 30 some hills of potatoes, all selected from one plant; you can see what a tremendous difference there is in the result from these plants. I want to say that we have made decided progress in hill selection. Now we have a timothy garden which is exceedingly interesting, showing the variations in the timothy; and this breeding work I believe will result in great value to the State. It is being carried on at Cornell University, and this next picture will show what is happening at State College. The best plot here of this pure bred timothy has yielded at the rate of almost half a ton more to the acre than the ordinary timothy which we find on the market. We hope to have this seed before long to send out in small quantities to farmers to try out. We are also making a variety of experiments with wheat, corn, potatoes and oats.

Now, then, I don't believe that this slide has ever been shown away from State college. We have not said very much about our selected work, but I do want you to know that Mr. Nolden's Department of Agronomy is doing a great work along the line of selection. We are working with three different varieties. Now it is an experiment to determine the value of selection, picking out special plants and breeding them until you have enough that is worth while, and we have some that are worth while. Take Reliable, for example; it yielded 32.1 bushels to the acre, while selections which have been developed at the college have run 37 and 38 bushels to the acre. Notice Golden Sheaf; the normal yield of the variety as we started it was 37 bushels to the acre; our selections run 44 and 45; and down here with the Pulcaster the difference is even greater; the normal variety ran 30 bushels to the acre and our selections ran 35 and 40. We think that work is going to be valuable to the wheat growers of Pennsylvania and will soon be in shape to put the results before the people in a form that will be worth while. Now you will note that each of these ears of corn are numbered. Will someone from the audience tell me which is the best ear? Can you see the numbers.

(Some of the audience selected No. 82 and others No. 80.)

PROF. WATTS: Now the point I want to bring out is that these ears of corn represent an ear to the row test; the figures below are not the numbers but represent the yields which have been produced by these different ears on the average basis. How about this ear? Does that look good? You don't like the looks of that, do you? That ear produced 81 bushels to the acre yet you would not think of selecting that for the corn show. Whoever picked No. 82 made a good selection, because it produced 82 bushels of corn to the acre, yet it is not a very good ear for the corn show. Over here is an ear that does not look so bad, in fact it is a much better looking ear than some of the others, and yet that produced only 55 bushels of corn to the acre. The lesson is this, that you cannot tell from the looks of an ear of corn what it is going to do when it is planted; the only way to find out is to make an ear to the row test. Corn is just like people, you cannot always tell by the looks of a person what there is in them, and so it is with corn.

THE RELATION OF BIRDS TO AGRICULTURE

By DR. WELLS W. COOKE, *U. S. Department of Agriculture, Washington, D. C.*

Mr. Chairman, Ladies and Gentlemen: The question of the relation of birds to agriculture is something which has taken up a good deal of attention in the last few years and has at last, after many years of agitation, finally been taken up by the United States Government; and it was in connection with my work under the Federal Migratory Game Bird Bill, the bill for protecting migratory game birds and migratory insectivorous birds, that the material was obtained which I want to talk to you about this morning.

Now we will start right out with the slides. I wish I could say that all birds were beneficial. If I could, why that of course would end the discussion. But unfortunately, some birds are not beneficial, although very fortunately the number is a very small part of the total number of birds. We have here in Pennsylvania about 375 different kinds of birds, and out of those we can say that only three are entirely injurious. One of them we have on the screen now, the great horned owl. Its food is quite largely the beneficial bird. It is given here with a quail in its claws, although I think that the painter, when he put that there, rather stretched the facts of the case. I don't think that the great horned owl ever does much injury to quail, but the next one we have on here, Cooper's hawk, is shown with a quail in its claws because that is probably the worst enemy, next to man, that the Bob White has. The Cooper's hawk comes down in the field, and if he finds a covey of quail he is pretty apt to stay right there until he has taken the last one of them. The sharp-shinned hawk, which is very much like the Cooper's hawk, only a little smaller, is the third one of the three kinds of birds we have in the State which may be considered as entirely injurious. But I don't want you to consider that because these birds that I have mentioned as injurious are hawks and owls, that, therefore, all hawks and all owls are injurious; on the contrary, the hawks and owls are among the good friends of the farmer and we have had one experience at Washington which showed this very plainly. A pair of barn owls lived in the tower of the Smithsonian Institution and a man there in Washington in our office took it on himself to find out what those owls were eating. An owl does not tear up its food very much, it swallows it almost whole, and then the bones and hair, the indigestible parts, are thrown out as pellets from the mouth and these pellets accumulate in large numbers where ever the hawks roost or nest, and this gentleman went up in the tower of the Smithsonian Institution and gathered up these pellets to see what these owls had been eating and he found that those pellets were composed almost entirely of the bones and hair of mice. He counted the heads of over 700 mice in the pellets from that single pair of owls in that one winter, so you can see how largely they have been working for man's benefit. The two hawks on the screen there now, the red tailed and the red shouldered, are those that are commonly called the hen hawks, and yet they do not deserve that name. It is very seldom indeed that either of those, which are our largest hawks, take anything in the poultry line. Their food is the smaller mammals, mice. The sparrow hawk, our smallest hawk, receives that name, sparrow hawk, simply because it is small. It really does not eat sparrows, its food is very largely grasshoppers during the summertime and mice in the winter.

Then we come to the group of sparrows which are pre-eminently the seed eaters, and yet we have one exception. Sparrows are beneficial with just the one exception of the English sparrow, and unfortunately it happens that it is the most numerous of all. I had expectd when we made a bird census last year, a census of the birds of the United States, that we would find the English sparrow to be the most abundant bird in the United States, and I was quite surprised when the returns came in to find that the robin exceeded it. Judging by the census of last year, the robin is the most numerous bird in the United States. To us who live there in Washington that seems a little queer, because robins with us are rather uncommon through the summertime; they are almost a rare bird in the breeding season, and coming up here yesterday, I noticed particularly as I got north of Pittsburgh and up into this northern part of the State how numerous were the robins. The train scarcely passed a farmhouse anywhere without my seeing from two to four or five pairs of robins. It seems queer that the English sparrow should have been brought to this country, because it was brought to rid the trees in Central Park, New York City, of the worms that were destroying them. Well, the sparrows never did eat those worms, they never would, they are insect eaters but they found here a climate that was congenial, they found plenty of food and they have multiplied until now they extend from ocean to ocean and have become, as I said, almost our most common bird. And yet I was glad to see, a few years ago that even the English sparrow could do some good. We had there in Washington an attack of the seventeen year locusts and they were very abundant, just a hum all day long, and from the time those locusts came out of the ground the English sparrow practically gave up all other food and devoted itself to the seventeen year locust. It would fly up in the trees, grab a locust, bring it down to the ground and it seemed to recognize that if it ate the whole locust it would get filled up too soon, so it would just grab it by the head, pound it up and down on the pavement, pull off the head, eat that, leave the body and get another locust. It must have killed thousands and tens of thousands of locusts, so there is one good deed you will have to credit to the English sparrow.

The crow I suppose has been the cause of more profanity than any other bird in the State of Pennsylvania, and yet I doubt if even the crow is quite so black as he is painted. He does like to pull up your corn and has been accused, and I guess rightfully, of stealing eggs out of birds' nests and taking even the young birds, but there are two sides even to the crow question. You take it along in the spring when the young crows are just growing and they have got tremendous appetites and keep those old birds hustling all day long to fill the mouths of those young crows, which are fed quite largely on the white grub of the larva of the May beetle, which is one of the bad insects or bugs on the corn or strawberries, in the grass patch and then later on in the season when the young are full grown, both the old and the young feed quite largely on the grasshoppers; so you see there are two sides even to the crow question.

I suppose the robin has been the cause of more discussion than any other one bird. I remember once we were having a meeting down at Lancaster and I had been talking in favor of the birds and a man got up and said, "I want to register a protest against the robin; it does us a great deal of damage in our fruit." When he sat down, another man got up and said that that was just his experience exactly. It is only a little while ago that the people in New Jersey, the fruit growers in New Jersey undertook to get the New Jersey laws changed so as to allow the killing of robins; but the friends of the robins proved more numerous than the fruit men and succeeded in keeping the law on the statute books that prohibits their killing. I think the worst hard luck story I have ever heard in regard to the robins comes from California. A gentleman went out into one of those valleys up in the foothills of the mountains and set out a fruit orchard and the land proved favorable, all the conditions were favorable, the trees made a good growth and when they came into bearing, he expected to receive a good return on his investment. It happened that the first year that the trees were in full bearing there was almost an entire failure of the native fruit upon the mountains above him, and the robins that ordinarily would live on that native fruit and that much prefer the native fruit, if they have their choice, came down on to his orchard and cleaned out everything as fast as it ripened. Naturally he was very wrathy and he went down on the lowlands and went around among the orchardists there and tried to get them to unite with him in a petition to the Legislature to have the law changed so that they could kill the robins, and he could not find a single person who would unite with him in that campaign. They said, "We know they have taken some of our fruit, but we have become convinced that on the whole they do us more good than they do harm." The food of the robin has probably been studied more carefully than that of any other bird, and it has been found that while it does take some fruit, yet, when the young are in the nest, those young are fed almost entirely on insect food, and the amount of food that a young robin takes is almost beyond belief. It eats more than its own weight of food every day. Now just think what would happen in this hotel here, what this proprietor would think, if you folks should undertake to do that. And as I said, that food is almost entirely insect food and that comes at the time of the year when our crops are growing fastest, when insects are most numerous, when the insects are doing the most damage to the crops, so that the birds help us most just when we most need their help.

There is another bird, the woodthrush, on the screen here now, whose food and habits are practically the same as those of the robin, and I just wanted to show the results of that large amount of insect food that the birds take. The bird from the egg to this stage is about four or five days and in about the same amount more, that is in about ten or eleven days from the time the egg is hatched, the birds have become old enough to get out from the nest, so you can see the very rapid growth that comes from that very large amount of insect food that they take.

The bluejay is another one of our birds about which there has been some discussion. Personally I have known bluejays all my life. Where I was raised in southern Wisconsin, we had them in our yard; they nested there; we had them there all the year through and I never saw the least signs of any trouble of the bluejay with the other birds. There were plenty of other species nesting right around there They were all on good terms, and yet reports come into our office every little while of bluejays doing damage.

The bobolink is a bird which used to be counted as one of the injurious birds. It has been a little queer in conditions of affairs there. Years ago when South Carolina was the principal rice growing state in the United States, there is no doubt that the bobolink did a good deal of damage. The bobolink winters down in South America, way down in Brazil, and sometimes in its northward migration it gets up into Florida and South Carolina about the time the rice is coming up in the spring; but it does not do much damage then, but passes on up and comes for nesting to this part of Pennsylvania and northward.

I was out a few minutes yesterday afternoon around the fields here, and I found a good many bobolinks were present here now—it is called bobolink up here; with us, in Washington, it is called the reed bird, from its habit of staying in the reeds at night; and down in the Southern states it is called the rice-birds. It nests from northern Pennsylvania and southern New York northward, principally in New England and the northern states up into southern Canada, and throughout all that region it is one of the best loved of the birds. It is one of the finest singers we have and throughout all that region it is very carefully protected both by law and by custom and a man would no more think of killing the bobolinks on his place than he would the dog or the cat, and so it has a care-free existence. Through the summer it raises a good family, and when the young are full grown, those small family parties unite into larger parties, and those into still larger as they move toward the south, and by the time they get into the Southern states they have assembled into very large flocks. And as I say, years ago when South Carolina was devoted to rice growing, the bobolinks were very injurious on those rice fields; they used to get down there in the fall migration when the rice was in the milk. Rice grows on the top of a stalk like oats and the bobolinks, settling down on those rice fields to eat the rice, would settle on the stalks and their sharp claws would pierce the grain and let out the milk and they actually did more destruction with the claws than they did with the bill, and at first, in the early days, the rice growers used to try to kill them but they found they were too numerous for that and they have devoted their energies just to making a noise to keep the bobolinks in the air; they station the little darkey boys in the fields with guns to fire them off and make a noise and keep those bobolinks in the air and you can get some idea of their numbers from the fact that one planter in one year used up five tons of gunpowder, 10,000 lbs. of powder, just for keeping those bobolinks in the air off his rice field, and it was estimated that when they were at their worst they did a damage of $2,000,000 a year.

Well now that has practically all ceased. South Carolina has ceased to be a rice growing state, and though the bobolinks go back and forth over that state as they did before, the investigation made by our office a couple of years ago failed to show any particular damage that was done by that bird. The amount of good that a bird can do depends, of course, principally on its habits; but also on the time of the year that the bird is with you and the two kinds of woodpeckers given here, the smaller one below, the downy, and the larger one above, are our best conservators of tree growth. They are with you all the year and their food consists almost entirely of the insects that would be injurious to the trees.

And here is another little bird, a great favorite of mine, the little chickadee, that is also one of the beneficial birds. It is small, it spends its time around in the trees, and through the winter time particularly, lives very largely on the eggs of the insects that it finds secreted in the cracks and crevices of the bark.

The cuckoo is not a very handsome bird, but he has the habit of that toad that was spoken of by the speaker last night, of taking little hairy things. Its particular food that it likes especially, is the hairy caterpillar. It is almost the only one of the birds that will eat those caterpillars, and I have been interested there in Washington to see how the habits of the bird has changed owing to an incursion of these caterpillars. The cuckoo is naturally a very retired bird, found out in the thick woods, but of late years the maple trees in the city of Washington have been attacked by the Tussock moth and the cuckoo has come out of the woods and come into town to eat those caterpillars of the Tussock moth, and we find them more commonly around the streets of Washington than I have ever seen them anywhere out in the woods.

I said in the beginning that persons had become convinced that birds were not receiving the protection that they deserve, that protection under the State laws was not sufficient and that it was necessary to get Federal law on the subject. The agitation for this began several years ago and as soon as the campaign was fairly under way the people in charge of it were quite surprised to find that a large part of the gunners of the United States came over to their side. They had taken it for granted that they would have to fight against the hunting part of the community, but the hunters had awakened to the fact that the game birds were becoming lessened in number; the wood duck was one of the ducks, one of the game birds, that showed most conclusively that the laws were not strict enough, and so by the help of the gunners they were able to get through this Federal law.

The woodcock was another of the game birds which showed a very alarming diminution in number. This picture of the woodcock on its nest was taken at Washington. A man of my acquaintance found the nest, and by approaching very carefully, without alarming the bird, was able to walk up to the nest and stoop down and stroke the back of the sitting bird, while another friend took the photograph. So you can see what a very persistent sitter the woodcock is when the eggs are very near hatching.

When this Federal Game Law passed, it was almost the last official act done by President Taft, the signing of that Migratory Game Bird Law, just a few hours before he went out of office. That law covered migratory birds. It was found that Congress could not pass any other kind of a law. A bird which lived all the time within the boundaries of a state had been declared by the highest Court over and over again to be the property of that state and not subject to Congressional action, so that the only kind of a law which Congress could pass was one that would have effect on the migratory birds, those which passed from state to state, both in the game birds and the insectivorous birds. It happened that the carrying out of the provisions of that law was put in the hands of the Department of Agriculture, and I was one of the committee and still am, that has charge of the carrying out of the provisions of that law, and one of the first things we had to do after that law was passed was to find out what birds would come under the provisions of that law, what birds were migratory and what birds were not, and that has occupied quite a little of my time for the last two years.

The bird on the screen here now, the cardinal, is one of the best examples of an absolutely non-migratory bird. You do not have it as far up in the State as this, but it does come up just about to Beaver. It is quite abundant in southeastern Pennsylvania. As I say, it is an example of the bird which is absolutely non-migratory. Most cardinals are hatched and live and die and never go ten miles from the place where they were originally hatched.

The screech owl is another example of an absolutely non-migratory bird, staying the entire year right within sight of the home spot.

The goldfinch is another example of a non-migratory bird, with this difference—most people know the bird through the summer in that upper plumage there when it is black and yellow, but in the wintertime, the bird changes to another plumage represented by the lower bird, and a good many people that are familiar with the summer bird do not know it in that winter plumage; but the bird is here all the year.

Then we come to a series of birds—I have three or four of them—which are just on the dividing line. The meadow lark with you up here would be a strictly migratory bird; with us in Washington and up as far along the coast as New York City, it is on the dividing line between migratory and resident. We have meadow larks with us at Washington all the year, though it is not probable that any one meadow lark stays there all the time. Our summer meadow lark goes south for the winter and their places are taken by meadow larks that come in from the north. But you see the legal point is this, that if we should undertake to arrest a person for shooting a meadow lark there under the National law, he could claim that that particular meadow lark that he shot was one that had stayed there all the year and consequently did not come under the Federal law, and we could not disprove it; the burden of proof would be on us to prove that that particular bird was migratory and we could not do it. The same applies to the red winged blackbird, although 95% of the red winged blackbirds are migratory, yet last winter, for instance, we had a few that stayed right through the entire winter, so that although up here they would certainly come under the migratory law, it would be a disputed point with us. And the same applies to the flicker, those birds which are most of them migratory, but a few individuals stay through the season.

Among the earliest migratory birds to come to Washington is this brown thresher, and I take that particularly because that is a photograph from one of the most celebrated of Audubon's plates, the brown thresher being attacked by a blacksnake and the other birds coming to the rescue.

Among the migratory birds that come down from the north and stay with us through the winter, is the golden crowned kinglet, so named from its crown. Among the real migratory birds is the redstart. That is as good an example as you can get of the common bird showing the three plumages, the full adult male at the top, the adult female in the middle and the lower bird is the one year old male which has the white throat of the female but shows a few feathers of the black coat which it is going to have next year. The Baltimore oriole is an example of a strictly migratory bird, going outside the United States for the winter and returning for the summer, and the same is true of the indigo bird, which is also shown with two plumages. The male and female scarlet tanager is one of the best examples and I wanted to show that particularly on account of the changes in plumage.

Probably all of you are familiar with the bird, the upper one there, showing the fully adult scarlet tanager in the full plumage; the one at the bottom is the female; the one in the middle is the male in the transition period. The scarlet tanager nests in this part of the country and all through the eastern part of the United States, and then in the fall, as soon as the young are fully grown and out of the way, the male begins to change its plumage from the scarlet and black to a plumage like the female; that is the greenish yellow, except that it keeps the black wings. It goes down to South America for the winter and winters there in that greenish yellow plumage; then as it comes north in the spring, it begins to shed those greenish yellow feathers and gets the red and as it comes into the Gulf states of the United States in the spring, it is like this middle colored bird, just changing from the greenish yellow to the red. By the time it gets here, the greenish feathers have all dropped out and you have the scarlet and black bird you are familiar with.

The chimney swift is another migratory bird and apparently interesting from the fact that it is the only North American bird whose winter home we do not know. We have in North America about 800 different kinds of birds, and we know where everyone winters except the chimney swift, and it is one of our most abundant birds. We can trace it in late September and early October as it goes south and gets down to the Gulf states about the middle of October, and then it disappears. It could not disappear any more thoroughly if it was true, as used to be thought, that the chimney swift went down into the water and hibernated in the mud at the bottom of the ocean and the Mediterranean Sea; that was the old idea, and they could not disappear any more thoroughly if that was the fact and then five months later, along in April, they come back in their full numbers; but we do not yet know where the chimney swift spends the winter. I had a most interesting experience with these chimney swifts a few weeks ago. I was up at Harper's Ferry and over on the bank of the Shenandoah, opposite the town, I was there about six in the evening and happened to look over towards Harper's Ferry and I saw a large number of swifts circling around the town. I knew that meant that they were intending to spend the night in some chimney in the city, so we watched them there for a while and then concluded that we would go over nearer to them. As we started across the bridge, those circling clouds began to drop down into the chimney of one of the churches there which was right in plain sight and a great number of the birds went into that chimney while we were crossing the river. Then we went over till we were near the base of the chimney and I said, "We will stand here now and count as well as we can the rest of them that go in." The numbers had been increasing all the time by recruits and we got where we had a perfect view of the birds as they would drop down into the chimney and although I could not count them exactly, yet I tried to have my count lower than the truth rather than above, and we stood there for about an hour and a quarter, while those swifts were going into that chimney, and my count was 4,700 that went in. We estimated that a thousand had gone in while we were crossing the bridge; and, as I say, I thought my count was under the truth rather than over, so that the probability is that there was something like 6,000 swifts that roosted in that one chimney and it seemed to be a pretty small chimney.

Now that is a pretty big story. I was talking on birds there in Washington early this spring, and up to that time the largest number—I had seen the swifts go into chimneys a good many times, but the largest number I had counted was about three thousand, and I told them this same story about the swifts circling around and going into that chimney, only I put the number at 3,000, and I have heard from that from all directions since that time. It comes to me something like this: A person says, "Why, I liked your lecture, but when it was so good, why did you put in that nature fake about the 3,000 swifts going into the chimney?" Well you see I have just doubled it, I have got it 6,000 now.

The birds in migrating from eastern North America to their South American home—and there are something over 100 different kinds that make this migration—do not take what would seem to be the natural course. Suppose birds from eastern North America are going to winter down here in South America, you'd think they would come right across through here, across the West Indies and Cuba. That route is taken by a few birds. The bobolink goes across there and it is the most common bird that does. Then there is another course down through the islands that a bird could take and not be out of sight of land the whole day. We don't know of any bird that takes that course. The great bulk of the birds cross the Gulf of Mexico, right at its widest point, coming along through the eastern United States, going down the same general course, the trend of the coast, through western Florida and then across the Gulf and down to Central and South America, and that requires a flight of 700 miles across the Gulf of Mexico, and it is made in a single flight and in the night time. The birds start soon after dark, fly through the night and reach the other side just before daylight, and they are not tired by that trip, if they were they would not take it because they don't have to, they could go around, and we have proof that they are not exhausted by it because, in the spring, when the birds return, there are a great many hundreds and thousands of them that fly across from the southern shore, do not alight when they reach the coast of the United States, but fly all the way from 100 to 200 miles inland before they alight. There is one line out here, this route marked No. 1, which is a straight shoot from Nova Scotia straight south to South America, which of course would be the shortest route. There is no land bird that takes that route. Take a common little summer warbler, one of our commonest birds; it nests here, abundantly and winters down here, but instead of going across, it goes around nearly 2,000 miles out of its way; but there are some of the water birds that do take this route.

This bird and the golden plover is one of the best known birds that takes that migration route. This shows the two plumages, the black breasted, the breeding birds' summer plumage, and the white breasted, the winter plumage, and that bird does take that route across the ocean. It nests way up here in the Arctic, along the coast of the Arctic lands, then as soon as the young are full grown, both the old and the young come out here to the coast of Labrador. There is a berry there called the curlew berry which grows in great profusion over the Labrador rocks. That bird is very fond of them and the birds stay there several weeks, gorge themselves full and get ready for their great flight. Then they come down across the Gulf of St. Lawrence, out here to Nova Scotia, and then start on this straight flight across to the coast of South America. It is about 2,400 or 2,500 miles that they fly, and they make that entire trip without a stop, providing it is good weather.

I told you that the birds flying across the Gulf of Mexico made the flight in a single night. But it would be impossible for the golden plover to make that 2,500 miles in a single night, because birds, when they are migrating, are not flying at their fastest, probably about 40 or 50 miles an hour is as fast as they ever fly in migration, and at 50 miles an hour it would require two whole days and nights of flying to accomplish that. Just think what that means,—flying continuously for two days and two nights without a particle of rest. The plover is not a bird which could light down on the surface of the ocean and then start again; it has got to keep going continuously for that 48 hours. And yet we have reason for thinking that the bird even in that long trip is not exhausted because, if it was, it would not take it, it does not have to, it could just as well go around by the coast but it takes that long flight from preference. I had some curiosity to see how the plover compared as a flying machine with the best that man has yet been able to make in the form of an areoplane. The fat in the bird's body is the fuel that is burned up to make the force that carries that bird on this long flight, and we know that that plover has at the outside not more than two ounces of body fat which is used by it for that 2,500 mile flight. Well, if an aeroplane was as good a flying machine as the birds, then a thousand pound aeroplane would need for making a 20 mile flight only one pint of gasoline.

I wrote to the officer at Fort Meyer who has charge of the U. S. army aeroplane and asked him what was the best that their machines had yet been able to do, and he wrote back that 1,000 lb. aeroplane for 20 miles would require a gallon of gasoline; that is a gallon for the machine as compared with a pint for the bird. In other words, the bird is eight times as good a flying machine as the best that man has been able so far to do.

The golden plover has a migration route of about 8,000 miles, but the one on the screen here now, the Arctic tern, has the longest migration route of any bird in the world. It nests way up in the Arctic; it is well called the Arctic tern because it nests just as far north as there is anything solid on which it can build its nest, and then it winters just as far south in the Antarctic as it can find any open water from which it can get its food. It lives on fish, so that no bird can have a longer migration route than the Arctic tern. It is about 11,000 miles from its summer home to its winter home, and it makes that round trip every year; that is approximately 22,000 miles a year, in its migration course. There is one little thing that happens from that, that the Arctic tern sees more sunlight, more daylight, than any other animal in the world. Because when it goes up to the north for its summer home the sun is already there and it has continuous sunlight throughout the four months that it is there; then it goes south for the winter and by the time it gets to the Antarctic the sun is also there and it has continuous daylight for the four months it is there, so that it has daylight for eight months in the year and part daylight for the other four months.

Now, in conclusion, I just have a few slides that I happened to have on hand that I thought would be interesting. This shows a robin's nest built on the top of a previous year's Baltimore oriole's nest, using that as the foundation and building its nest on top. This is the nest of the mallard duck, and it shows the down, you all know the eiderdown; the mallard has the same habit of plucking the down from its breast and laying it over the eggs when it leaves the nest to keep them warm while it is gone. There's a handsome youngster; it is the great blue heron about six days old. I think this is one of the most artistic bird pictures I have seen, this herring gull just lighting down on the nest. And the last picture that I will show is the humming bird, and I want to particularly call your attention to a widespread misconception of the food of the hummingbird. You hear about it and read about it as visiting one blossom after another to get the nectar. As a fact, a hummingbird is not there for that purpose at all. The food of the humming-bird are spiders and it goes from one flower to another in order to eat the spiders that are down in the bottom of the blossoms.

SOME ORCHARD INSECTS AND THEIR CONTROL

By F. H. FASSETT, *Meshoppen, Pa.*

It may seem rather dull and dry after listening to such an interesting talk on birds, to come down to the practical subject of the control of insects in the orchard. It has been my endeavor for the past 25 years to learn the best way and the best materials and the best time to control these insects in my orchard work. There are a number of different materials on the market that are being used, and to my mind many of the spray bulletins and spray calendars, without any criticism of these things, are misleading to the average orchardist or apple grower because of the fact that they give us so many remedies and so many different times of spraying that it would lead one to believe that we must spray continually in the orchard. We have found that for practical purposes of control of these insects, that we believe we can control the insect enemies of our trees and of our fruit with three sprays. There is, to my mind, a right time to spray and a wrong time. If we can do our spraying just at the right time, then we believe we can control so many more insects than when we do it at some other time. For instance, the spray for the scale—if we can do that spraying just at the proper time, then we not only control the scale, but we control so many other insects along with it. It has been customary to spray for scale at any time in the winter when the tree was dormant. We realize that at this time many people have more time to do the spraying than at some other time, but we have learned this, that if we can put that spraying off until the buds of our trees are bursting open, then there is not only the scale to control, but there are a number of other very injurious insects that we also control with this scale, making it an application not only for the scale but for a great number of other insects.

We have come to a time if we expect to get the best prices for our fruits we must control the insects in our orchards. In order to better understand how to control them, it becomes necessary for us to know something of their life history, that we may attack them at the weakest point. The study of insects offers a very interesting field for the orchardist; we can watch them as they go through the different changes in their life cycle. Right in our orchards we have two classes of insects to deal with: one class known as a sucking insect, which pierces whatever they are on and extract their food from it, consequently we cannot poison their food and must kill them with something that comes in contact with their bodies; hence these remedies are called "Contact Insecticides." There are several materials that are used for this purpose. The ones commonly used are soluble oil, lime-sulphur solution, and tobacco preparations.

The other class of insects are the chewing insects, or insects that take their food by biting. The potato beetle is a common type of this class of insects. For their control arsenic in some form is used. We believe for practical control of the insects in the orchard affecting the tree and fruit, three sprayings are all that is necessary. The first spray is for the insects affecting the tree. There is no doubt that the soluble oil on the market has the greatest killing power of any of the contact insecticides. But in the use of the oil, there is an element of danger. If we always realize this and use it rightly we believe it can be used safely and with profit. It should be used on a bright sunshiny day so that it may evaporate off the trees as soon as possible. A very fine nozzle should be used and never hold the nozzle on any part until it forms in drops and runs down the trees. This is where the danger lies. Lime and sulphur solution is a much safer remedy; you may drench the trees with it and not injure them. The formula for the home-boiled solution is, 2 pounds of sulphur, 1 pound of lime, 1 gallon of water. Boil for about forty-five minutes or until the sulphur has all gone into the solution. Many growers are using the commercial lime and sulphur. As a rule it is more dense. Usually it is worth about three cents more per gallon than home boiled. In our work we use the commercial lime and sulphur as a contact insecticide. For an arsenic, we use the arsenate of lead in paste form. We believe it goes into solution better and sticks on the foliage longer than any other form.

The first spray should be made just after the buds have burst open. The materials used should be lime sulphur solution at scale strength and two pounds of arsenate of lead to each fifty gallons of material. We realize that it would be impossible in large commercial orchards to spray each tree just at the right time. But we believe that it ought to be as near to that time as possible. Because we can control the scale just as well then and we believe better, and we can also control a number of other insects as well. The green aphids or plant lice hatch from an egg laid near the bud and commence to feed on the tender tissues of the bud. They belong to the sucking insects and can be controlled at this time. The blister mite winters over in the scales of the bud and as soon as these conditions exist, they come forth and commence to feed on the tender leaves. These are also controlled. The cigar case borer which winters over in the larva stage, covered with a tough brown covering in the shape of a cigar from which it takes its name, as soon as there is food for it, comes forth and can be controlled also. The bud worm winters over in the larva stage; as soon as these conditions arise it commences feeding upon the opening buds and leaves. It is also controlled by this late spray. There are also a number of other insects that are controlled by a spray at this time.

The lime sulphur also possesses a fungicidal value and we also spray for such fungi diseases as apple scab, sooty fungus and other fungus diseases, spores from these disease will soon be loosened by the thousand. With the tree well covered with this material, the conditions are such that they cannot take root and grow, hence you see how important it is that this application should be made at the right time or as near as possible. The spraying must be done very thoroughly if we expect to succeed in controlling the insects. The second spraying should be done just after the blossoms drop, and before the lobes close up; this usually occurs eight to ten days after the blossoms fall. This spray is for the enemies of the fruit. The materials are diluted lime sulphur solution. One gallon of concentrate to 25 gallons of water and 2 pounds of arsenate of lead to each 50 gallons. It has been found that nearly all the larva of the codling moth enter the apple at the calix end, hence it is necessary that we force our spray in the calix cup as well as to cover the foliage with spray. The egg for the first brood of the codling moth are laid on the leaves or some smooth surface near the cluster of apples. They hatch and probably feed for a short time on the foliage, then enter the calix end of the apple. It is necessary then that we cover the foliage as well as fill the calix cups with spray material. The operator should be on a tower or platform from six to nine feet high so that he can look directly in the calix end of the apple and be in a position to force the spray into the calix cups. This spray is not alone for the codling moth but there are numbers of others that we can control. The apple curculio, whose feeding punctures causes our apples to be knotty, also feeds on the foliage and we can control it. This insect is always worse in sod mulch orchards or where the orchard joins the woods, because these conditions offer ideal hiding places for them to breed. Clean tillage will destroy many of these insects and all leaf eating insects such as tent caterpillar, green apple worms, and canker worms will be controlled.

We still have a weak contact insecticide, which will kill all young scale. It contains fungicide for the further control of scab, sooty fungus, bitter rot, and frogeye fungi. This is an important spray and should be very thorough. The third spray should be made about thirty days after the second. In an orchard where spraying has been done for years and a good system of orchard management has been maintained this spray may be omitted, but when necessary the same materials should be used as in second spray. If you have it at your command a little more pressure should be used. The eggs for the second brood of codling moth larva are laid where two apples touch or where an apple lays against a limb; hence it becomes necessary to force the materials up between the apples, and between the apple and limb so that the first feed of the little larva may be poisoned. If he gets one feed without poison he is beyond our reach and we are bound to have wormy apples. With these two materials properly applied at the right time and in the right way we can control the insects that infest our trees and fruit.

PROFITABLE APPLE CULTURE

By SHELDON W. FUNK, *Boyertown, Pa.*

Mr. Chairman and Friends: I realize very well the uncomfortableness of this room, and I assure you that I am not going to keep you one minute longer than is absolutely necessary. We are going to hurry through this as quickly as we can. If there is anything which comes along that you don't understand, or that I fail to explain, don't hesitate to ask me and I think we will be able to get through in very good time.

Owing to the fact that this last season apples have been selling very low, a great many men have come to the conclusion that there is no more money in the apple business. I have met a great many fellows who are getting very sick and claim that the apple business is going to be overdone; that we have overplanted the apple. Possibly we have. But we must remember that the low price this last season was not due alone to the fact that we had a rather large crop; but it was due more to financial conditions, because, when we look at statistics, we find that the crop was not overly large. Our crop this last season was about 41,000,000 barrels. In 1912 we had 47,000,000 barrels and in 1896 we have 69,000,000 barrels, so you can readily see that we did not have an exceptionally large apple crop, and still the prices were very low. But if you have overplanted, that does not mean that we are not going to make any money out of it. There is money in every business; it depends upon the management whether or not you are going to get it out. Nobody is going to grow apples at a loss; if you cannot grow apples at a profit, you are going to get out of the business. But the fellow who does stick, who does pay attention to all the things that go to make good apple growing, is going to make money out of apples.

There are two things that I think are very important in the growing of apples. First of all, I believe we have got to grow apples of the very finest quality; and, secondly, I believe we have got to be in a position to store those up and hold them until the market is right or as near right as we can get it. Any of you men who have watched the apple market during the last number of years have noticed that almost every year apples have gone up a little bit late in the season, and the man in a position to store his apples and hold them till that time usually made some money out of them.

Let's have the pictures. I am not going to take up that side of it, but just bring out a few slides about the culture of the apples and we will skip along rapidly. The first slide shows the first operation in the digging of nursery stock. You have four mules fastened to a long knife like arrangement that goes underneath the ground and cuts off the roots of the tree. This shows the tying of the trees into bunches. Two straps go over the tops and are drawn tightly together. This shows several troubles of nursery stock. The upper one is the wooly aphis which Mr. Fassett explained to you. Down here we have crown gall and down here we have two demonstrations of hairy root. Whenever you find either of these conditions on your trees, I would burn them or destroy them. Mr. Fassett explained the wooly aphis to you. Here we have a slide showing a cover crop of hairy vetch and rye. You will notice two small boys in here and it will give you some idea of the height of the cover crop. In my estimation, it is the coming cover crop for the State of Pennsylvania. I don't believe that anything will give as good results as hairy vetch and rye.

A Member: You stated when you were down at our place that a good thing for us to plant as a cover crop was buckwheat; if we sow that buckwheat early, won't it be self-seeding and won't we have trouble with mice?

MR. FUNK: I made the statement in this way. That on your Lancaster county soils, where you have limestone and are trying to grow peaches on the limestone, you usually have a good bit of trouble in the ripening up; your wood—the trees grows a little too long in the season, makes too much wood growth.

A Member: But this is in the apple orchards that we are speaking of.

MR. FUNK: I recommended the buckwheat on the peaches more than anything else to help ripen the fruit; at the same time you could harvest the buckwheat and secure a partial crop, but when it comes to the apple orchard I would rather have the hairy vetch and rye and I recommended sowing another cover crop like crimson clover which you can use with the buckwheat and when the buckwheat was harvested, the other would come on.

Here we have a slide showing the starting of the apple orchard with the sod mulch system. The orchard is sown with rye; the rye, about the time it comes to head, is cut and placed around the tree as mulch. It is one of the best ways I have ever found of getting a large amount of mulch. To begin the sod mulch plan in the young apple orchard, here we have the spring tooth harrow, with steel frame in it, which is used in cultivating low headed apple or peach trees. This frame can be removed. One section of the tooth goes underneath the trees and elevates the soil underneath, and then after we have cultivated the entire orchard in that way, we take out the frame, put the harrow together and cultivate the remaining portion.

This frame should be of the same width as the spring tooth when the two sections are together. Here we have a one year old apple tree, that is planted one year before pruning. Here we have the tree after it has been pruned. You will notice that we only have left three branches; I don't like to have more than three or four. You will notice also that the head is well separated. These are rather close together, but that does not make any difference because we have the other part in the top and that head will never break. If the three came out at one place, there would be danger of its breaking. We have cut them back. I like to keep them even over the top, because it makes a nicer, rounder tree.

Here we have a three year old tree before pruning. This was the first year's growth cut to the second year, cut to here. I believe in cutting up trees to one year, that is cutting to the outside buds, you notice as they were cut here. The next slide shows the tree after it has been pruned. We have thinned out these branches, getting our leaders, but we are not cutting back this year. We cut back for two reasons: First, to stouten this part there; secondly, to spread the head. Now we are going to let this tree branch because it will branch right here at all the terminals, and then the following year, if it needs cutting back instead of cutting to an outside bud, we will be cutting an outside branch; that will spread the tree faster and give fruit sooner. Here we have a slide taken in Clarion county showing the tree before pruning. We had to cut the tree out very hard to establish our leaders; that meant that there were no small limbs in here and it leaves the tree very bare. I simply give these two slides to show what you would do with a tree of that age that had never been pruned.

Here we have a five year old winesap in full bloom. It has been pruned, as is shown in the other pictures. It spreads nicely, is not thick in the center and is not very high. The next slide shows the tree with the apples on it and gives you an idea of what the stamen winesap will do at that age. Here we have a seven year old smokehouse, a very beautiful tree, one of the most beautiful I have ever seen in the State. That is in full bloom. Here we have a seven year old stamen winesap. Some of these pictures were taken in my own orchard; the others were not. There is a tree that picked about four bushels of apples, seven years of age, and all the apples were first-class and perfect.

This slide shows us the way not to prune an apple tree. You will notice that this picture was taken just after the man had finished; you can see the branches, the limbs, lying down here in the snow. He left several stubs here to hang up his coat or hat in the fall when he went out to pick apples, and that is a thing we don't want to leave. This is the thing that has given us all of our rotton trunks. You often find apple trees with rotten trunks and it was due to the fact that at some time the man who went out here to prune left a stub of that kind. If a limb is cut close to the collar, it will always heal, but if you cut it that way, it will never heal. The rot fungi start in here and work back through the line and down into the trunk and the result is that the tree is permanently injured. Here we have a tree pruned differently. It shows a 20 year old start. This picture was taken just before pruning and not after and the result is we have quite a number of small branches that should come out. I have given you the slide to show the build of the tree. This is another tree in the summertime; it is just as easy to grow trees of that kind as the one I showed you several slides back. The only difference is in the treatment. We find in the State of Pennsylvania a great many old apple trees that have been almost killed by scale; all of the upper branches have been cut off and now the question is how are we going to renew those trees? We don't want to cut them down, because the trunk is still good, and if we can renew it in about three years we will be having apples.

Here we have a tree just before renewing it. You will notice on this tree that the water sprouts have started; if those water sprouts had not started we would not dare cut it back the way I am going to cut it back here; it would be necessary to leave in some of the branches. The next slide shows the tree after it has been cut back, and we can make a new tree. If we had not had the water sprouts, it would be necessary to leave in some branches for shade and to prevent sunscald. Unfortunately we have trouble with some of our nurserymen and oftentimes it is necessary to graft and bud over limbs.

We want to know a little bit about budding or grafting. Here we have some of the tools used in budding and some cuttings showing the apple and currant cuttings that are made to be placed in the spring. Here we have the operation of budding You can bud almost any kind of a tree and we must bud the peach tree. Grafting does not work well on the peach tree and does not work well on the cherry. I prefer to bud cherries and apricots also, but the other trees we can graft. This is the first operation we make, splitting the bark. You make an up and down cut and then a cut across the top and if it is made about the end of July, the beginning of August when budding should be done you will find that that bark will spring loose. Then we cut the bud in this form. The bud looks like that after it has been cut. That bud is taken and slit down in between underneath the bark and then tied with something like raffia, or if you don't have raffia, take cloth of any kind and tie it tightly, leaving the bud exposed, and in about three weeks the bud will have grown fast and next year you cut off the tree above the bud and the bud will start to grow. There we have root grafting, the same operation as what is known as whip grafting. You notice this is your scion. Make the cutting that way and slip it. This is the stock and that scion is slipped into the stock in this way, tied and a little bit of wax placed around the graft and it will grow very easily. The bud need not be waxed. This must be waxed. Here we have several other grafts. This is the cleft graft, the graft we must always use in larger limbs, and you will notice, most of you are acquainted with this graft, you split the limb.

There is one thing I want to call your attention to, I would always have a bud at the shoulder right there and always be careful to cross the cambium just a little bit. You will notice that these scions are not put in straight up and down, they are crossing just a little bit. If you will remember that, you will never have the least bit of trouble in getting grafts to grow. Over here we have what is known as the bridge graft. Sometimes we have trees girdled and don't want to lose them and can oftentimes save them by putting in a bridge graft. This is the way you make your graft. Both ends are cut a little and then you split the bark here, insert one end her and another there. It is well to place a small tack in each end and wax it as you see in this illustration here. That is a rather hard operation, but oftentimes we can get them to grow very easily and save the trees in that way.

Here we have a young tree that has been top grafted, a six year old tree, that turned out to be a wild tree, so we put on another variety and you will notice we have grafted four limbs and then left these side limbs for shade. In two or three years all those side limbs will come off and we will have the new top coming on there. Here we have an old tree that has been top grafted. It shows one year's growth. This picture was taken this spring just after the leaves had come out. The ends of the limbs have been grafted and on the side of the tree we have some water sprouts growing up that we have left there to grow for shade. Eventually all those water sprouts will come out and we will have a new tree. This shows a twenty-year-old gano at home, and there is one thing I want to call your attention to and that is that it was necessary to prop this tree, due to the fact that it had not been thinned properly. If the tree had been thinned properly, there would have been no occasion for the props. Here we have a stamen winesap of the same age. You will notice that that tree was thinned properly and no props are needed, with the result that the apples are a great deal better on a tree of that kind.

This is a slide showing the work of the apple leaf hopper. It is a serious trouble, but oftentimes you will notice it working on your young trees disfiguring the leaves in that way. I merely give you the slide so you will be able to recognize the trouble. It is not serious. You don't need to pay much attention to it. Here is one of the most serious apple or pear or peach diseases in the State of Pennsylvania, that is the fire blight; it is the worst disease we have in the southern part of the State, doing a great deal of damage. You will notice all these dead twigs here have been blighted. The only thing we can do is to cut it back, cut out the dead twigs. Always cut back into the new wood and then watch your fertilization. You will find that the trees fed too heavily with nitrogenous fertilizers will always blight more than a tree not fed so heavily. This is a slide showing the codling moth. Mr. Fassett explained that and I will not waste any time on it. Here we have a sprayer that does very good work in a hillside orchard. You will notice the wheels are very low and you can spray on a steep hill before there is any danger of the machine toppling over. This is the last slide and shows the finished product. That is the kind of apple that we grow when we do everything just right. When you have apples of that kind, you have no trouble in disposing of them and you have no trouble in finding a market and always at good prices. Let's have the lights, please.

Now we have a few minutes more and there are one or two things I would like to take up because I believe they are rather important, and we have gone over this cultural proposition here very rapidly; but there is one thing I want to bring up in particular, and that is, if you are going into the apple business and you are going to take care of those apples, let's do all of the operations right. I believe that is very important. During the last six or eight months, I have spent considerable time in looking up the cost of the production of apples, and I have written to quite a number of men, I have spoken to quite a number of other men, and I have figured out the following costs.

Now I know that you people are not going to agree with me, that is not all of you, because perhaps under your conditions it will cost more or it will cost less, but remember that these are average conditions for average varieties; and the point I want to draw out is that the cultural operations, the growing of the fruit, costs very little compared with the marketing of it. Now these figures are taken on 20-year-old trees. The average cost of producing a barrel of apples is about 29 cents; that is counting the labor, all of the labor and the material used in the orchard, such as fertilization, cultivation, cover crops, thinning, spraying and pruning. I am not counting the interest on the investment, insurance or anything like that, but simply the labor and the material that goes into the orchard to grow the crop. We are not counting picking or packing, and these are as near as I can come to the figures: The cultivation and the cover crop, about five cents per barrel; fertilizers, about five cents; spraying, four cents; pruning, six cents and thinning nine cents. Now those figures are all high compared with most men, but there you see we have 29 cents to grow the barrel of apples. Then we will follow it a little bit further, taking 15 cents for packing, 15 cents for the barrel, including freight and hauling, 45 cents; including freight, storage, etc., we have a total of $1.20. Now after we have got the barrel of apples ready for the consumer, it has cost us $1.20. And here is the point, in order to make it pay, I believe we should do all of those labor processes right. I know a great many men in the State of Pennsylvania that are good sprayers, they are good cultivators, they are pretty good pruners, but they fall down on fertilizers and fall down still harder on thinning.

A Member: When do you start to compute that cost?

MR. FUNK: That was about eight months ago.

A Member: I mean at what age of the tree.

MR. FUNK: This is a 20-year-old tree. Now a young tree will cost more than an older tree perhaps a little bit less, but this tree is 20 years old. I say more of us fall down on fertilizers and still more on thinning. I believe that more trees are dying to-day in the State of Pennsylvania because they are starved to death than because of anything else. We find it everywhere and I say I believe that we ought to fertilize a little better and we ought to thin a little better.

Now we will take the fertilization again. Paying five cents a barrel for fertilizer, you will be able to keep that tree growing in first class condition; you will be able to have it make as much wood growth as it should. I like to have on a tree of 20 years of age anywhere from 8 to 15 inches, and that is the best sign that I know of to tell us whether or not we are treating that tree rightly. For nine cents we are able to thin that tree, and we will take up the importance of thinning a little bit later. Last year I sold quite a number of apples right out of the orchard. Apples at that time were selling at 35 cents a bushel, that is apples that had been picked and sorted and put in the bushel boxes, not packed, understand, simply put in the boxes, 35 cents a bushel and I sold my apples the same way, no sorting, right off the tree, for 70 cents a bushel; in other words, apples were selling for $1.05 a barrel and I got $2.10 a barrel for my apples in the same condition. There was a profit of $1.05 made entirely on those twenty-nine cents because the picking and the packing and the sorting and everything else on good apples does not cost a cent more than on poor apples; in fact the picking and packing of poor apples costs more than the picking and packing of good apples. Now can't you see that? Most of us think it costs too much to thin, we cannot afford to put on enough fertilizer, we cannot afford to spray as thoroughly as we should, or we cannot afford to cultivate as often as we should, but you can see at once that the labor cost is very low and if, on the twenty-nine cents I was able to make $1.05. I think it was pretty good profit and I believe we ought to do every one of those operations just right, we ought to give that tree just as much fertilizer as it should have; we should spend just as much in pruning as necessary; we should spray it just as well as we possibly can; pay no attention to the cost—except that I try to do economical work—and then last of all I believe we should thin all of the fruit.

I am just going to waste a few minutes and take up the thinning proposition, because it is an operation that must be done now within two to four weeks, depending upon whether you are going to thin plums, peaches or apples. It is the one operationI have found in the State of Pennsylvania has been neglected more than any other operation. Most people have an idea that it is all right; but they are from Missouri and you have got to show them, and the only way they will find out is for you to go into their orchards and show them by pruning one or two trees. I don't believe you can ever get a man to thin his old orchard the first year. First of all, you want to begin at the right time and that is when the apples are about the size of a quarter of a dollar, as soon as you can handle them nicely. Peaches we thin just after the June drop. I don't want to pull off those apples with my fingers because I will take off a great many of the fruit stems and injure next year's crop, and if I have a cluster of four, I will injure the fourth so it will drop also. First, take a small shears and clip the stems; secondly, take the poor ones, then the small ones and then take the good ones until they stand six or eight inches apart and do that over the entire tree.

That is where you are going to have trouble. A fruit grower never gets it in his head that one apple four inches in diameter will weigh as much and make as much as eight apples two inches in diameter; I repeat that one apple four inches in diameter will weigh as much and make as much as eight apples two inches in diameter. Where you have a limb growing eight apples ordinarily, two inches in diameter, you might as well have a limb with one apple on it four inches in diameter; it is not only worth more, but it is not nearly as hard on the tree, because we all know it is the development of the seed and not the flesh that drains upon the vitality of the tree. The flesh of an apple does not drain the vitality of the tree; it is the seed and that is the reason why, when we leave all these apples upon the tree we have so many more seeds and get a crop every other year. That is very common in a great many sections. We have a heavy crop of apples this year, next year nothing, the third year a heavy crop again, and so on, simply because when we had so many apples, it drained so hard on the vitality of that tree that there wasn't sufficient energy left in it to develop the fruit buds next year and the tree had to lay off one year to develop the fruit buds. Thinning will not always give you a full crop every year; you must have the right varieties. But you take a Roman Beauty or a Stamen Winesap and thin it hard and unless you have cold weather, if you treat the tree right you will find that you will get a good crop every year. The Baldwin is one of the trees that won't do it, and still in Lebanon county I was shown something there that proves very well what thinning actually will do. I visited a man one day and he took me out into his orchard and there he had a great big Baldwin apple tree and he said, "There is an apple tree that last year was so loaded down with apples that I thought it would break to pieces. At the time I should have gone out to thin it, I was ill, I couldn't get out of the house, but one day my wife came out and thinned that tree as high as she could reach from the ground, went all around the tree on the ground and thinned off the apples as high as she could reach, and when I went down that summer the limbs were so loaded down that they had to be propped up all around the tree, and from there to the top of the tree there was scarcely an apple on the entire tree—from as high as you could reach from the ground."

I don't want you to go home and try to thin the whole orchard, but thin a few trees and thin them until you think you have taken them all off. Better not do it yourself; better hire some other fellow, because you will never thin them hard enough. I never do any thinning at home because I can't. I like to get a good bunch of boys together, boys of 15 or 16 years of age, active and not afraid to get up on a ladder, take those fellows out in the orchard and show them just how I want it done and I stay there just long enough until I see they are doing it right, and then get out. If we stay around we will always have too many apples on the tree, but if I am gone they will do it right. Those fellows don't care; if I tell them to take off all the apples, they will take them off, it don't make any difference to them, but it would to me and I can't thin an orchard as well as some fellow who is paid to do it. I thank you very kindly for your attention.

HILL SELECTION OF SEED POTATOES

By DANIEL DEAN, *President New York Potato Growers' Association, Nichols, N. Y.*

Seed selection is now attracting more attention than anything else about potato growing. Its value has been proven by very accurate experiments extending over several years at a number of experiment stations. Many farmers have found seed selection to be one of the most profitable parts of their work. I was one of the first in the United States to use it, beginning in the fall of 1904 by digging about 300 bushels with hooks and saving the best hills. The following year this selected seed gave an increased yield and greater market value. I have found the profit from seed selection to be even more from the increased sale value than from the better yield. The cost is very small, consequently the net profit above cost is large in proportion.

We are always on the lookout for some new variety which should displace those we have now as these in their time drove out the Burbank and Early Rose, themselves successors to now forgotten varieties. Many thousands of new seedlings have been, and are constantly being tried out. From these a list of less than a dozen varieties can be made out which are superior to all the rest. The chance against getting a new seedling variety better than those we now have is in the same proportion of thousands to one.

We have always thought of a potato variety as something unchangeable, though with also the belief that sooner or later it must "run out." Seed selection has now proved that varieties are made up of many separate strains, differing more or less, with further variation going on most of the time. From these variations within a variety we can select and keep up a strain having the particular qualities most suited to the needs of any grower, in the same way that we now select the variety most suited to our conditions. It is now believed that unless a variety is grown under unfavorable climatic or other conditions that it will keep its vigor indefinitely. One variety has been grown in Sweden over one hundred and fifty years.

Conditions in the United States are often poor. In their original home in South America the growing season was long, wet and cool. The tubers were small, and but little drain on the strength of the plant. Out of the many thousands of varieties produced we have kept for our use only those that produce very heavy crops of tubers in one half or one third of the time required by the original potato plant. In connection with our hot and dry climate this throws a very severe strain on the vitality of the potato. It is not strange that some plants break down and produce tubers nearly worthless for seed. In northern Europe the great ocean current, called the Gulf Stream, makes the climate much more favorable to the potato than here. Yet differences in vigor are seen even there as tests between seed from the north and south of Great Britain show. In our South the summer heat is so great that potatoes maturing at that time are nearly worthless for seed. When planted in the same section so as to mature in the cool weather of fall, good seed results; the so-called "second-crop" seed. Even as far north as Ottawa, Canada, dry and hot weather in 1906-7-8 ruined the varieties grown there. *I believe that growers should study every possible means of maintaining vitality of potatoes in hot and dry seasons.* Not only is the crop reduced at a time when prices are highest, but the seed is injured for the following years.

We find that our varieties are constantly developing new strains in each, some valuable and some degenerate. We can prevent injury and store up vitality by growing them under as favorable conditions as possible. Then by the use of different methods of seed selection we can find and use as seed each year the best yielding and selling strain of the variety most suited to our climate, soil and markets.

Many experiments show that when the tubers of any hill are used as seed each has a strong tendency to resemble the parent hill in all its qualities. Every potato grower is consciously or unconsciously changing his varieties, either for better or worse. A number of methods of choosing seed potatoes are in use. Having never seen any comparison of the merits and defects of more than two or three together I will try to present a fair discussion of the whole subject.

THE USE OF SMALL SEED

By carefully digging a field of potatoes it will be seen that a few of the poorest hills produce a larger proportion of the small tubers. The best hills produce mainly large ones. Diseased hills are almost certain to have a light yield and the tubers mainly small. I have selected hills for seed for 11 years, always choosing the best yielding. Now I get less than 2% or small in good seasons, even though the hills are planted only a foot apart to produce the medium sized stock demanded by city markets. I do not feel that the reduction of the small tubers till there not enough to plant the next year's crop is a serious objection. Farmers use small seed because it is cheap. While it is possible that the increased yield from the use of large seed might not pay the extra cost, the use of small seed year after year increases the proportion of weak and diseased hill, the yield diminishes, and the variety is said to be "run out." Many scientific experiments have almost always shown better yields from large than small seed when sorted in the usual way. The Geneva Station has made a test in which care was taken to have the large and small tubers taken from the same hills in order that the inherited vigor might be equal. Under these conditions the small seed was at least as good as large pieces of equal weight. While an exceptionally all the best hills in a field of tubers longer than the usual variety of bad season might produce many weakened hills with small tubers small seed may be considered safe if taken from a stock from which the weak hills are kept eliminated by some method of seed selection.

THE USE OF LARGE SEED

This produces a better crop and better seed at an increased cost. Often farmers buy new varieties which produce well at first because the seedsmen have grown them using large seed and have had good winter storage conditions. The yield often falls down as soon as handled under the usual farm conditions.

SELECTING SEED ACCORDING TO AN IDEAL TYPE FOR EACH VARIETY

This plan would be of immense value if we were certain just what points in the appearance of a tuber were reliable indications of its value as seed. The Uncle Sam variety varies all the way from smooth flat-oval shape to a longer and rougher type, the vine, flower, etc. being the same. I once selected the hills which were smooth, discarding those longer and rougher. The yield compared to other varieties declined so rapidly that it was apparent that the poor looking hills were the ones that had given the yield. With the Rural this same smooth type is found in the best hills and is the best seed. Tubers longer and narrower than the usual type of any variety are to be regarded with suspicion in most years, especially if the eyes are longer than usual and clustered closely around the seed end. Prof. C. L. Fitch, in Iowa Extension Bulletin, No. 20, states, that "Flatness and relative shortness are the result of healthy growth and signs of strength." One exception I have noticed is that in seasons like 1909 and 1912 when a long drouth was followed by plenty of rain after the tubers had reached their usual shape, I have seen all the best hills in a field of tubers longer than the usual variety of type. Where seed selection was not practiced by neighbors the enlargement took the shape of knots or prongs. The poorer hills died earlier and their tubers were of the usual variety type. When these best hills were used as seed the following seasons the shape went back to normal. Prof. Wm. Stuart, of the National Department of Agriculture, states, that shape is often affected by the nature of the soil and culture methods as well as the season. So for the present we are not warranted in depending too much on any rigid type as a means of selecting the best seed potatoes. Any one making a tuber-unit test will be greatly surprised at the variation between different units although the seed tubers may have been as near exactly alike as it was possible to select from the bin.

MARKING AND SAVING HILLS WITH LARGE TOPS

The large tops are often believed to indicate large yield. While this is often advocated and appears at first thought very probable, I have never been able to find any scientific experiment in which seed from hills with large tops was compared with that from hills judged on the basis of yield and appearance of tubers. My own experience in 11 years of seed selection with a total of over 50 varieties is that hills with large tops are seldom the best yielders. Selection on the basis of yield has practically eliminated the extra large tops. Prof. W. A. Orton, one of our best potato disease experts believes that large and late growing tops may be an indication that the plants have been injured by the heat. I have found them in blue-sprout, white-sprout and Irish Cobbler varieties. Usually each hill has a small number of very large potatoes which are coarse, deep-eyed and often hollow. As these are almost unsalable in large cities, this is another objection to saving hills with large tops.

BLIGHT RESISTANCE

A few years ago there was demand for blight resistant potatoes. Sometimes these late growing hills were saved on that account. One of the best potato bulletins we have, Ohio No. 218, by Prof. F. H. Ballou, states, that "Experiments coupled with many observations suggest that little is gained by selecting parent hills on the basis of disease resistance of the plants over selecting parent hills because of superior individual yields. It is the actual work done within the hill that should most interest the potato breeder. The later growing hills simply demonstrate that there develops, through natural plant variation these tardy, deliberate, slow-maturing strains which we should not mistake for strains of special disease resistance. At the Vermont Station hundreds of varieties have been tested for blight resistance. Few showed much, and these were commercially useless from other defects in yield, shape, etc.

SELECTION ON THE BASIS OF A PARTICULAR NUMBER OF SALABLE TUBERS TO THE HILL

Practical growers know how the number set in each hill varies with each season. In 1914 the set in my field was small, and the tubers large. In 1905 there were too many in the hill and the crop ran small. In 1910 one field had a small set and another planted with the same seed the same day but with a light sandy soil set nearly twice as many to the hill.

EARLY REMOVAL OF WEAK AND DISEASED HILLS

Most potato diseases reduce the yield of the affected hills. Removing hills with fusarium wilt, black-leg, leaf-roll, curly-dwarf, etc. leaves a healthy seed stock which will give a better yield the next year than if the diseased hills are left. Particularly is this true where small seed is planted, as diseased hills produce many small tubers. Some of these diseases also infect the soil and attack potatoes for years after. This digging must be done before the healthy tops die. Work is usually not pressing at this time. The extra expense is small as these hills would have to be dug and picked up later anyway.

THE TUBER-UNIT METHOD

Good sized tubers are taken from the bin of as near the same size as possible. These are quartered lengthwise and planted in adjoining hills. When dug all are piled together. This method has an advantage over any other in that one can begin in the spring and have clear proof of seed transmission of plant characters the same season. This method of quartering all seed is objectionable after the first year because of different strains varying greatly in size. The quarters from the strains which have only a few large tubers to the hill will give a better start to their plants than those from the strains with a larger number of medium sized tubers to the hill. As these large potatoes are worth less per bushel, this method increases the proportion of poorer yielding and less valuable potatoes. There is also considerable labor and trouble in keeping units separate. Other objections are that some growers are liable to pay more attention to getting a particular tuber type and to large vines than to yield and sale value.

DIGGING BY HAND AND SAVING THE BEST HILLS

This is especially adapted to the immense proportion of our crop dug by hand. Where machine diggers are used the seed should be dug before the crop is ripe enough to dig without bruising by the machine, unless late blight is known to be in the field. In that case the seed may be dug later on days when the ground is too sticky from rain to use the machine. It is certain in Europe and probable in this country that immature seed yields better than that allowed to become fully ripe. The only extra expense over ordinary hand digging is a little care in keeping hills separate and that of going over the rows and picking up the best hills first. While some may be better because of a better chance on fertile spots it is very unlikely that any seed will have the same luck two years in succession. So the second year will throw out all except those that yield well because of their inherited vigor. Farmers can be persuaded to use this method because it involves less change from their present methods than any other. As the number of hills worked with is limited only by the size of the field the chance of finding the very best strains is increased.

HILL-UNIT OR HILL-ROW SYSTEM

Planting a short piece of row from the produce of each hill or larger unit is the most accurate method for scientific work and for farmers who have the time for caring for several hundred strains. Field methods of cutting seed must be used as the results are more reliable for farmers' use than where the tuber-unit method of quartering is used. With any strain the pieces must be of equal average weight or the tests are worthless. From each strain a similar amount, say one bushel to the short row should be saved for comparison. The whole of the produce of the best strains should be saved to produce seed for the main field crop.

PRACTICAL POINTS

Before beginning seed selection a grower should first make sure that he has the type and variety most suited to his climate, soil and markets. Eastern city markets pay the highest prices for flat, round to oblong white potatoes of medium size and good cooking quality, smooth, without disease and free from second growth shown by knots and cracks. Red varieties may be sold in summer. While others may do well in some seasons the Rural type of blue-sprout varieties do best from New England to Minnesota, including most of New York and Pennsylvania. The Green Mountain or white-sprout type is best in the cooler climate of Maine and northern New York, and does well further south in cool and wet seasons. Burbank is raised on the Pacific coast and the Pearl,under irrigation,in Colorado. Irish Cobbler, Bliss Triumph, Green Mountain and other varieties are raised in the north to be sold in the south for seed.

It is necessary to test new varieties at least two years because of variation between seasons and because they may have been kept under different storage conditions. The seed selection can be begun with all the first year and all but the best variety discarded.

Any score-card of points may be used in the selection of a type, variety of strain according to the wishes of the grower. With most of us net profit is the thing to be most considered. This may be produced in different ways. For early markets, extreme earliness pays better than high yield on account of high prices. Quality and white color are also less important than with the late main crop varieties. Freedom from disease must always be considered unless like scab it can be prevented by disinfection. High yield, good appearance and table quality are almost always the largest factors in securing the greatest net profit.

Beginners should use spring scales until their eyes are trained to judge the weight of hills with fair accuracy. At first a hill with a few large tubers will appear to the eye to be heavier than one with a larger number of the medium sized tubers that sell better. Large size is a bad defect for city trade. There is some danger in trying to work against the usual type of a variety as I found in trying to select a smooth type of the Uncle Sam at the cost of reducing yield. Shape may be affected by the season, character of soil and culture methods. Small tubers may be expected in any hill. Some varieties like the Irish Cobbler normally have a numerous second setting, at least with me. Weight of salable tubers should determine judging, disregarding small ones unless many more than usual. Any mixture of varieties should be thrown out. One is the best for any one set of conditions and only that one should be kept.

I never saved any poor hills to test till 1912. That year the low yielders row averaged only 70 bu. per acre against 350 for the adjoining rows treated exactly the same. In 1913 the low yielders averaged 150 against 290 for the normal. This was not a fair test as the low yielders were mature when a frost, September 14, killed the others while in full growth. In 1915 the yields were 74 and 334 bu. per acre. In some seasons low yielding strains may be told by a longer and more pointed shape than normal.

I dig about one acre out of 17 each fall with hooks, either before the rest are ripe enough to dig with a digger or on days too wet to use a machine. Each hill is kept separate. Next I go over the row myself and select 5 to 20% of the best hills. This is the hardest part and requires the best judgment. These selected hills are planted the next year in a seed plot on the best part of the field, if necessary extra care should be given. The soil should be one holding water well for times of drought, the time when seed vitality may be injured. Early in the fall and before the tops on the healthy vines die, a hook should be used to remove all weak, early, dying or diseased hills. This year I found only 4 bushels of such on 5 acres yielding 1,810 bushels. Small tubers from such a plot are as good as large but there are not very many.

Owing to the different parts of a field varying greatly in yield it is better to take a percentage of the best hills rather than to use a rigid standard of weight over the whole field. This percentage should be higher in the good parts than where potatoes are poorer because of possible injury to the vigor of seed from poor parts of the field. In case conditions are so poor that degeneration takes place it would be best to save only from the best part. Seed selection cannot prevent loss of vigor, but it can quickly eliminate the damaged strains unless the injury is so severe that all are affected.

Scientists are not agreed as to whether the yield of a particular strain can be increased by annually selecting the best hills. It is regarded as certain that the average yield of a variety can be increasd by finding and multiplying the best strains within the variety. As a farmer I am well satisfied that this can be done with profit by using some of the methods here given. The cost is so small that every hour spent is well paid. I believe that I have received greater returns from the time used in seed selection than in any other thing done on the farm.

EFFICIENCY IN HOME-MAKING

By DR. HANNAH McK. LYONS, *Lincoln University, Pa.*

Mr. Chairman, and Members of the Institute: There is a saying "that the perfection of art is in the concealment of art," and I think sometimes if this is true anywhere, it is true in our homes, where our efficient worker is able to keep the little details, the little bringings together that makes the home perfect, out of sight, as it were. You say, "But we don't want to conceal art." Neither do we, but after all I think if I bring you an illustration just out of the many meetings that we attend in a year, you will catch my idea. For example, one comes to preside at a meeting and manage it through and a large part of the time perhaps you are just grated on the least little bit. They are always making excuses for the person that is not there and what they intended to do and meant to do and tried to do. Again, you go into a meeting and your presiding officer somehow never makes excuses; at the same time they have just as trying things to manage; but it is always the thing we are going to do and that we get done that they present to you. And so in home making; if we may keep out of sight the little things that we meant to do and have not quite accomplished and always bring forward to view the things that we are accomplishing and that we are doing, it seems to me that that is real art and yet it is the concealment of art, as it were.

Within the last few years many new words have been coined and brought to us; at least, if they are not entirely new words, they come to us with a new force and new meaning. I think you will recall not so many years ago when we all began to use that word "strenuous;" it was the *strenuous* life we were leading, or someone was leading. Again, I think you recall when we began to use that word "conservatism" so much, when we were conserving the public interests, that is the great natural resources of our State. Again it is the word "efficiency" perhaps that we are learning to use with a new meaning, and so I believe that that word "efficiency" belongs to the home just as truly as it belongs anywhere. Somehow we women in the home feel—well I think we have been taught to feel that and we did it and we do feel it perhaps yet, that somehow the home did not amount to just as much as the farm; that somehow the home was not just the real thing and the whole thing perhaps. But you know things have changed and to-day you and I know that the home is just as important as the farm and that the home-maker ought to be trained as well as the farmer is trained; that the home-maker must know her work and her duty there if the farm be all that it ought to be.

Not very many years ago I think you recall the papers coming out with the story that where a certain piece of work had been done with perhaps six motions, that that firm was now able to produce the same thing, just as good in quality, with four motions, and so that news was heralded all over the world, and it was a wonderful thing that now, with just the four motions, as it were, this piece of workmanship was being turned out. I wonder if any of us have ever tried in the home just how many motions it took to do anything, and then whether, after realizing that we have used up a good many motions, we have tried doing the same thing right over again and using just half that many motions or a less number? And then, friends, if you have succeeded in doing it with a less number of motions, may we not herald to the world that a woman's work, a certain part of it, may be done with less motions; and if it is done with less motions, may not every woman know it, that the fatigue and wear that comes from this constant keeping on and on and on through the many hours of the day may be relieved and that she may find time for enjoyment, for reading or for something else? Have you ever watched two women at work, how one goes about and there seems to be continually that lost motion—not lost motion exactly, but too many motions? Lost motion I mean because she uses so many motions to accomplish a thing, and yet here comes our efficient woman doing the same thing and every movement she makes counts. Perhaps it is only clearing away the dinner table, but she never allows her kitchen table to get in such a clutter that she has to move this and that and the other and then move it back again and then change it on to her tray to go to the cellar, and perhaps the one article has been moved three or four times to get things in order before her tray is ready to go to the cellar or the storeroom or refrigerator or wherever you put it in its place.

See that the kitchen table is kept so that the thing here goes exactly to its place while we find it with our small people who are helping us and that we are training to be efficient workers, or the first thing you know the table is all in a clutter and you have to make half a dozen motions perhaps before you can bring order out. And see the extra work you are making, the extra fatigue there is because you are not efficient. Again perhaps it is housecleaning time and we have come into that time of year that we dread so much, but our efficient worker does not have her house torn up from garret to cellar, but she goes from one room to another at a time and perhaps the first thing she has attended to is her storeroom. The storeroom is in apple pie order and just ready for everything. When she cleans the room here on the second floor, the bedding is ready to be packed and it is pretty slow work this year, isn't it friends, because the weather has been so cold that we could not clean house really and do it right, but nevertheless our store room is ready and when the time comes for the winter clothing to go away, the store room and boxes are ready; and immediately, when they are ready they may be put yonder where they belong, the blankets may immediately go yonder where they belong; there isn't that lost motion of airing things and getting them ready to be put away and then piling them here in this room and you have got to do something there and they must be piled yonder and covered up from the dust. There is a continual lost motion there that is not counting for anything, and so I believe our worker who believes in efficiency is not doing that sort and I care not whether it is in the home or on the farm, it is all the same after all.

Again I think sometimes that one of the reasons we women have not thought so much about this matter of efficiency is because there has been no money value in our time. It has been simply a question of just crowding into each day all the duties we could get there. It has not been the thought of doing this and this to-day and to-morrow we turned around and had certain duties that might be done that day, but we just crowded each day as full as we possibly could; we had no thought of how tired we would be, the fatigue that would come by that crowding and crowding and crowding and fatigue never spelled efficiency, I care not whether it is in the home or on the farm, if you are fatigued you are not going to be fit for the duties to-morrow, if you have crowded to-day so full that your muscles are worn threadbare, as it were.

Just last week when we were getting ready to come away and things seemed to be crowded so full, I happened to go into Oxford, the village nearest to us, and in meeting a friend there, she said, "Now, you are in a hurry?" And I said, "Yes, rather hurried." And then she stopped and said, "But Mrs. P., my friend, says it is not right to be hurried so. If you hurry so and get very tired, you are not fit for work to-morrow and you cannot do your best work." I said, "No, I know that is true, but what are you going to do to get through when this and this and this has got to be done within 24 hours?" She says, "It is not right;" and so it is time we women learned that we had a money value, as it were, put on our time, and when a money value is put on our time—and, friends, it is worth money—but when a money value is put on our time, then will we women consider the things that we do and the things we don't do. For example, we will not spend time darning a pair of hose that you can buy two pairs for a quarter and will not last half or a quarter the length of time that a guaranteed pair will last and perhaps only cost half as much more. For example, when we think of our time being worth money, we will not spend two and three hours a week kneading the bread as it were, but for $2.50 we will have a bread kneader that will knead the bread just as well and with one half the energy spent in it. Again, we will not spend hours, as our mothers did, with the chopping bowl and knife, chopping, chopping, chopping, you know to get that cabbage or pickle or whatever we are making just in the right condition, but we will use the little food chopper that perhaps you can buy for half a dollar, or a very good one for $2.00 or less money even, and you will do the same work in much less than half the time, because we housewives have learned that the little chopper is one of the most economical things we can have, especially in the saving of time, and so I say we will consider the things that we do and the things we won't do when we learn that our time is really worth money.

Again, we will take care of the small things as we go through life, so as to watch the time that is being spent in doing things. For example I watched in a home not so very long ago when dinner was being served and I happened to be wandering around and not a cooking utensil was filled with water when the meal was over and the dishwashing was not an easy task. I think sometimes when I talk these things to the gentlemen they think it is pretty tiresome, but after all, men, if you washed the dishes you would know just what it meant if the dishes were put to soak immediately when the dinner was being served rather than left standing to be taken care of after the dinner is over. It is the little things after all, that make the great sum of the day, that make the big things when the day is over. It is the little things that spell fatigue or spell efficiency when the day is ended, as it were. In the home the guest was preparing onions, she happened to be visiting there and was preparing onions for the meal and the little daughter who was being trained for mother's efficient helper was wandering around watching the guest very closely, just as the little people do, you know, and not seeing her make the motions that she was trained to make—and you know how these little people are always ready to pass on things much more quickly than they are willing to do them themselves, and looking up, she said, "What is the first thing you do when you start working with onions?" And the guest, in astonishment, said, "I'm sure I don't know." And she said, "Always wash your hands and knife in cold water." She had learned her lesson but did not always practice it and so it is these little motions that count after all.

Sometimes we try to think that it is only in the great workshops that this word efficiency applies, and sometimes we think that our kitchens and our homes are not great workshops. But, friends, when I tell you that there are more than 18,000,000 people enployed in homes—and I don't mean just the mere servants employed there, but I mean the home-makers and managers—that there are more than 18,000,000 in this country of ours, then I believe our homes are a great workshop where we need to study efficiency in method, where we need to put more study on the subject than we have been putting on it.

And again, when I tell you that more than ten billion dollars is spent in food annually, isn't it time that we studied these questions of efficiency for the home? How much of it do they tell us is wasted annually? And is it any wonder, if you will just think for a moment of all the home-makers, of all the managers of homes of this 18,000,000 how many have been trained for their positions? If you will think for a minute how many you know that have been really trained for the position into which they have come, I don't believe you will count very many. So, friends, is it any wonder that mistakes are made in this business of home-making? Is it any wonder that there are little leaks, yes, big leaks and is it any wonder that wrecked homes are the result, sometimes? Very frequently in the great workshops they employ an expert to come there and that expert will stay for days in the workshop looking around and studying their methods of business and ferreting out where the little leaks are that these leaks may be remedied, that they may produce with less cost just as good an article. It seems to me that with the little opportunities that the women of this country have had to be trained as home makers, the little chance they have had to be trained in real methods of work and efficiency, wouldn't it be nice if we could have experts come into our home and show us where the leaks are? And when I say leak, I do not mean always where you are spending your money unwisely or where you are just using your food not wisely perhaps, but I mean where this lost motion is, where you are doing a thing over and over as it were and just one effort would do the work, and then it seems to me there would be hours left for the training of the children that so frequently we hear mothers say, "I don't neglect a thing in my home, but I haven't time to train my children." Well you know I believe that the home making, that is the dusting and sweeping and some of that work, had better be left undone than the children's training left undone. It seems to me that had better come first, but nevertheless I believe that if we only knew the methods a little better, if we only knew some of the things, the how of it a little better, that we would have plenty of time to do both.

Unfortunately we women are not mechanical, as a rule. You will find it occasionally that we are, but as a rule we are not mechanical, and it seems to me that there the brothers can come into the home making with such splendid results. May I give you a homely illustration just there: A wife became sick; she was the chicken raiser of the home; and as the small potatoes and kitchen refuse was kept for the chickens and heated you know, cooked up as they do sometimes and meal mixed, she just mixed it in the vessel in which it was put. Well, we women know how the meal will get spilled around the floor and won't mix very well and how long it takes to do it; but when she became sick her husband had to feed the chickens during that time and there was a splendid little trough built in the corner of the entry near the feed box, and some remark was made about it and he said, "I never bothered with that pot a day." It was all right, she had bothered with it for weeks and he had never seen it, but when he had the chickens to feed and the food to mix, he saw it. So, men, suppose you see a little bit before the wife gets sick and do these little things that count so much for efficiency and will mean so much for time and help to her after awhile. Many times a great deal of the lost motion in efficiency is in the arrangement of our homes, especially our kitchens, where we spend so many hours of the day, and here with our kitchen table as it were in the center of the floor or near the stove, where it ought to be or must be, might be grouped or ought to be grouped the stove and cupboard and the things we must go to back and forth, so that there will be just as few steps as possible to be taken in that home.

Many times efficiency may mean simply planning. It is not that you must know so much of great things, but simply that you will plan and be willing to plan. When we get up in the morning and start out for the day's work, if we don't have a picture of that day's work, a mental picture as it were, we will not accomplish in the same time nearly so much, but if you sit down with pencil and paper and write out the next thing you would do and the next thing and the next thing, you will find that at the end of the day you have done quite as much as you would otherwise have done. Somebody will say, "But I have no time to take pencil and paper and write out what I have to do;" but you have saved more time than you have taken in writing it out and planning it out, by the mere fact of sitting down and writing out and planning out, and this is especially true where there are children to train and child helpers. If you will jot down with pencil and paper the next thing and the next thing and the next thing that is to be done during the day, the children somehow will take it up and will not forget and will be much more efficient helpers than if they try to remember and try to just go along and go along as it were picking up here and there and not knowing whether there is anything to be done next until they have been called and been reminded that they have been very remiss.

And so we might go on with this word efficiency and find all the way through the day's work and the year's work that it fits in everywhere. But that we women need to know more of the methods of efficiency, and that bring efficiency. Several times during this last winter in my work, if I may come to a personal remark or two that has been made to me, someone will say, "You always talk for the women; don't you believe the men belong anywhere in this plan of homemaking?" I certainly do believe the men belong in this plan of home-making and I fully believe that no home is complete without the man element and the man nature in it, just as you men know a home is not complete without the women in it; in fact you have no home, no real home, without a woman in it. So do I believe that no home is complete without the man in it, and we only have to remember the homes where the men have gone out and the sorrow and the loneliness and loss that is there, to know the one is not complete, that no home is complete without both natures in it. You know the little couplet that says, "As unto the bow the cord is, so unto man is woman; and though she bends him, she obeys him; though she draws him, yet she follows; useless one without the other." And what is true in the home, friends, I believe is true everywhere. Men and women were meant to live togther and work together and we cannot seperate them. It is not a question of efficiency here for the woman and efficiency there for the man, but both working together that brings out the true efficiency in the home, the true efficiency everywhere there is work to be done in this world of ours.

I was interested not very long ago in an article about efficiency in the business world, where a business journal was advising the business world what would bring efficiency to business everywhere, and it seems to me that the very thing that will bring efficiency in the business world, will bring efficiency in the home world, and so may I give you the thought that you cannot get the most out of your business unless you are able to get the most out of yourself. You must feel right; you must be on your tip-toes all the time; and yet I know that many will say, "I couldn't work on my tiptoes all the time." It may be too much to expect that a man shall be right at his highest efficiency all the time; but that is the mark at which you should aim; in other words, if you cannot be on your tip-toes all the time, keep yourself there as much of the time as possible; keep yourself there not by working on your nerve, but by keeping physically fit so that you can develop high efficiency without speeding up the engine too fast. In automobile language, we are told that you can keep on high speed as easily and as economically as on low if you use the right grade of gasoline; and the right grade of gasoline in this case of efficiency for us friends is simply a combination of natural diet, pure air, recreation and the glad hand for whatever life brings to you; and I believe there is so much in that question of the glad hand, the facing of the things we have to meet and facing them believing that it is all right and that you and I can face them and that we will put them through in a manner that is wise and well, because efficiency is the word that means the things that are to be in the home and the training that we women ought to have.

COMMUNITY BREEDING

By PROF. HELMER T. RABILD, *U. S. Department of Agriculture, Washington, D. C.*

The majority of the cattle of this country represent haphazard breeding which largely accounts for inferior and unprofitable stock. In some neighborhoods an individual farmer decides to grade up his herd by the use of a purebred sire of a definite breed. Another farmer also decides to use a purebred sire, but because he does not want to appear to copy the example of his neighbor, he may buy a sire of another breed. Eventually there will be a community of rival breeders of all the dairy breeds, which is radically wrong. The remedy for haphazard breeding as well as varied breeding is a Community Breeder's Association.

The purpose of a Community Breeder's Association is two-fold:

First, to improve the native cattle by the use of purebred sires exclusively, and purebred cows so far as possible, all of the same breed.

Second, to put their business on a more substantial basis through co-operation.

The advantages of a Community Breeder's Association are as follows:

It is educational. A body of people in pursuit of the same end can profit not only by their own experiences but also in the experiences of their associates. However well informed a man may be he is continually meeting problems that puzzle him. He needs constant advice and suggestions from the brightest members of his association. He needs to exchange views with his fellow-men and to enlarge his perspective. A co-operative association can obtain the services of a speaker from the agricultural college, or prominent breeders from other associations. The experiences, not alone of one community but of many communities enable a breeder to overcome the many annoyances which he must overcome.

An association enables the breeders to co-operate in buying. A group of farmers can buy a bull in partnership and use him collectively. This is a great economy over the plan of several farmers buying their individual bulls and using them on only ten or fifteen cows. Moreover, if a large number of cows or bulls are to be bought for the community a large saving can be effected by having a representative committee of, say three men, purchase the cattle instead of each of the dairymen having to pay carfare and other travelling expenses incurred in the selection and purchase of animals by him for his own herd.

An association enables the members to co-operate in selling. Even though it be a small community it can build up a reputation not only in the country but among all nations. As an example of a small community building up a reputation for the Jersey cattle, we will cite the Jersey Island. As an example of a small community building up a reputation as a Holstein-Friesian center, we will tell about Lake Mills, Wisconsin.

In the consideration of such a subject as community breeding, it is well for us to note what has actually been done along such lines. One of the very best illustrations of community breeding is to be seen in the Island of Jersey. In the year 1789 the dairy farmers of Jersey succeeded in getting passed a law which very explicitly prohibited the importation of any cattle whatsoever for breeding purposes. After 1789 the cattle which were sent to the Island were sent for beef purposes only. They had to be slaughterd within a few days after reaching the Island of Jersey.

What has been the result of such a consistent effort in community breeding? One result has been a steady demand for these community-bred cattle. Cattle breeders from England, Denmark, Germany, France, the United States, and other countries went to Jersey Island to buy cattle because they knew that everybody on the Island was interested in the same breed of dairy cattle. Since everyone there owned cattle of the same breed, buyers were sure to get pure-bred animals. Furthermore, a dealer's chances for filling a large order for a special breed of cattle were good in a community where every dairyman kept the same breed of cows.

Other breeds of livestock owe their origin and development to community breeding. For instance, in the province of La Berche, in France, the community took an interest in the breeding of a certain type of horse. The famous Percheron, which resulted from this community breeding, is still eagerly sought for by buyers from other countries.

Every breed of improved domestic animal that we have to-day is the result of community breeding. Among cattle, we have already mentioned the Jerseys. We might also name, as examples of community breeding, the Guernsey, from the Island of Guernsey, the Ayrshire, from the county of Ayr, in Scotland, and the Holstein-Friesian, from the province of Friesland, in Holland.

A good example of the value of community breeding, is seen in the community breeding of Holsteins at Lake Mills, Wisconsin. Over $175,000 worth of Holsteins are shipped out of this community yearly. In a single year from 40 to 50 carloads of grade Holsteins left this community for Mexico. One buyer is reported to have purchased as high as 800 head. On May 5 and 6 last, there were 125 head of Holstein sold at an average price of $283.56. One bull, King Segis Pontiac Polkadst, consigned at his sale, sold for $6,800. Eighteen animals sold for $375 or above, sixteen for $400 or above, twelve for $425 or above, eight for $450 or above, and five for $500 or above.

Buyers are attracted to such a sale as the one held at Lake Mills, Wisconsin, because they feel reasonably certain of being able to buy in large quantities and also of having considerable opportunity for selection in sections where community breeding is practised. The breeders can co-operate in advertising their stock. If we look through any of the larger dairy papers we will find the advertisement from a community breeders' association. The expense of this advertisement is borne by the association. This is cheaper than a large number of small insertions. The prospective buyer writes to the secretary and the secretary in turn sends to the buyer a list of all the breeders in the association together with the descriptions and the prices of the stock each has for sale. The buyer is then enabled to purchase directly with the least inconvenience exactly the animal he wishes to obtain.

When a community becomes sufficiently interested to take up community breeding, it will very naturally use co-operation along other lines. It will be very apt to develop co-operative feed buying. It will also co-operate in the eradication of tuberculosis, contagious abortion and other contagious and infectious diseases. The spread of such diseases would be very materially check if, in a community, every farmer took an active interest and co-operated with his fellow-breeders in having his cattle systematically inspected. They would also tend to adopt better methods of sanitation and their efforts along these lines would result in a community owning herds that were almost disease-free.

In general, it may be said that community breeding advertises the community, attracts to it a class of large buyers, and, in addition, tends to bring about other less important, but very considerable advantages of co-operation such as co-operative feed buying and a co-operation in fighting disease.

SONGS THAT LIVE

By MRS. ROSE MORGAN, *New York City.*

The child who, grown old, finds himself in possession of the blest traditions and memories of the places and things of his childhood, enjoys a legacy whose worth increases with the years, whose meaning unfolds with life. Probably there is no form of early home influence more enduring than the home song; and its power is continuous in proportion to the place it occupied in that early home influence. The home song, therefore, should be fundamentally a thing of truth. It should not be the woven tinsel of fancy and sentimentality, but it should be composed of words and melody that are coined from the heart's pure gold. Such a song lives. There are few homes in this State where a good song, if once it became installed, would not be appreciated, and there is no home that would willfully cancel or lose the power of that song as a memory-maker and as a character-builder. Unworthy songs have crept in not because our home-making hearts are wrong but because our home-making heads and hands are so full of the work of the insistent present and the foreshadowing future that we do not often stop to weigh the values in songs as in other things.

We believe the song to be a character-making force. We believe that there are better songs for the country school, the grange, and the occasional country-life program than are ordinarily used in them. We believe that there are better hymns for the country church and Sunday school services. We believe, and it is this phase of the question we wish to deal with especially, that the home is the natural center of that power for good which we rest in song, and that there are better songs for it than the average home of to-day provides.

Already work has begun to meet the problem, which our weighing of the values has revealed to us, touching song in the home. The conclusion that the country home should, and can, and will, make a radical change in the character of its songs is being reached by the consent and co-operation of fathers, mothers, teachers, preachers, and others who are vitally interested. These men and women are working to the end that the country home shall be clean of the "praise that cannot purify," of the passing life wherein life's sacred relations are made a joke, of the song that cannot possibly bring a sweet home-memory in the after years to the children who have gone out from the home.

It is true that most of the cheap and vicious songs originate in cities, but all too quickly they find their way into rural communities and homes. During the last two years many persons have gone over the matter together, have given testimony, and have compared conditions and experiences. From data that have been collected it has been found that for some reason it is true that to-day the young people in the country homes are almost or quite as much exposed to the blight and contamination of trashy and filthy songs as if their homes were not aloof from and independent of the sources and sites of such songs. The reason for this has been searched for and has been found.

The fear of not being "up-to-date" in the matter of songs, and the eagerness to have country homes and boys and girls enjoy what purports to be created for the giving of pleasure as exploited in the city, has set country people to hasty and indiscriminate buying of "the latest" music. The unworthy type of city music has been adopted, and it has been called representative; the vast amount of worthy music that is heard at its perfection in the city has been temporarily forgotten. Think of the church music, the operas, symphonies, and oratorios, the concerts and recitals of high grade! Many of these musical entertainments are free to the public and are even organized to be carried free to every part of the city. Think of the great choral societies, the carefully taught music in high schools and graded schools, the chances for the best of training in every phase of music—all of which tends to shorten the life and the influence of the bad song in the city, even though its spread is universal.

Better songs in the country home is quietly becoming one of the working texts in many communities of this State. There is not only the desire on the part of people in rural communities to choose between the good and the bad in songs, but there is the ability when thought and care are given to the judging.

When the trashy song secures a place in the country community, what is there with which to meet and annul its power for lowering the tone of life and the "blessedness of the country"? Perhaps there is a pastor and choir with appreciation of the value of good songs, perhaps there is a high grade music teacher or school teacher. It may be that the community has a patron saint who invests thought and time and patience and money to the end that good music shall meet and conquer the invading bad. The most effective influence for good in songs is the influence that emanates from the home, for it is lasting. The solution of the problem, however, rests largely with the individuals that make up each household. They may show their devotion to the high ideals of the country by refusing to buy, sing, or tolerate besmirching songs of the hour.

> Suggestion is the birth of thought;
>   Thought dwelt upon becomes action;
> Action repeated becomes habit;
>   Habit is character.

Because of the comparative isolation of the country home many desirable features of good home-making must come to it slowly. Its very isolation and independence make it the natural friend and advocate of the good song. Its open windows do not let in, perforce, the contaminating street song. Its doors can remain closed to the rap of a blighting "best seller" until the family within have taken time to pass upon the merits of that song, to discover whether or not it is in harmony with the family's aspirations to secure good things for itself, and whether it voices the family's spirit of independence in the obtaining of these things. Heretofore, the people of rural communities have hardly considered their responsibility in the setting of standards for good home and community songs. Now that the whole American people are working—slowly, it is true!— to the question of good and bad songs for their homes, is it not reasonable that the country people should assume a strong leadership in the matter? Should they not be the ones to say what shall and what shall not constitute their home and community songs?

The meaning of a song is conveyed by the combined force of its words and its melody. In a song the melody seems to give rise to the words and the words to the melody. Men naturally sing of what fills their heads and their hearts. The resulting song is good to the degree in which it suggests the good and the beautiful through its words or melody, or through both. A song is to be neither approved nor condemned because it is new. Nor should it be counted without merit if in actual use it seems to touch the hearts of young and old as it finds its way out into the world. But time and opportunity are as precious as they are fleeting; and what family is there that can afford to rest its family traditions and future memories on songs of uncertain quality when good ones can be had?

Since I have known that we were to have this evening together on "Songs That Live" the local song traditions of Pennsylvania have become of interest to me. And as truly as Pennsylvania has its distinctive people, features and characteristics, as truly are these distinctions written in the historical and traditional songs.

May I say to you at this time that I have made, during the last month, a list of songs which, by content or adaptation, or both, are peculiarly expressive of Pennsylvania and its country life, including some that are not only sentimentally and traditionally, but historically true of the local life of the State. It would give me pleasure to forward to you this list upon your request. Columbia University, New York City, through its department of agriculture forward to me mail addressed to me, Department of Agriculture, Columbia University.

But to-night let us prove to each other how, though local traditions give rise to interesting and long-lived songs, the songs that live and will live are those which we can all share in common because of their appeal to us all. We shall not apologize that the personal must enter in. My home is not one of the type you yourselves know. Its songs are your songs, also because "home songs" are a common heritage and because there is no life so well forward that it has no need of a heritage of home songs we spend the remainder of our evening together talking of and singing songs that live in our hearts as though we were all one large family, looking backward together, looking forward together.

Back in Wisconsin is an old home where six grown children go as often as they can. It has been my habit, as one of the six children, to go at Christmas time, and before the two weeks vacation is over, invariably I find the little chest by the piano side, and that chest is indeed a center round which the family gather. Father and mother were pioneers and they could not carry with them mahogany treasures and the silver and linens from back East. They took just the least possible as pioneers. And yet the children have a heritage, and I would not have it other than it is. The family treasure is the contents of that little chest. Very meager would that little treasure-chest be in some people's eyes; to mine it is invaluable. It contains the old home songs.

I want to say to-night that if you have the same kind of riches, then you have in your mind a great number of songs that are increasingly dear to you. They are the songs of your boyhood and your girlhood, and particularly the songs that you learned in and about your own old home. Now I would not say: "Don't sing this, and that," and suggest nothing of substitution. As workers and leaders you do not need to be taught, but perhaps you do need to be called to sharp account for a thing you know so well and perhaps do not do. So let us gather up some songs, some old songs, types of the world's "songs that live." If you will, we shall go together across to the countries that are older, and get some of their songs for yard-sticks, and then we will hold our own songs by them and see how they will measure up.

Let us go direct to the places where much of our blood comes from, represented here to-night. I have had a great deal of interest in looking up how many Scotch and Irish there are between New York and the Mississippi, and the percentage runs high. Twenty-two per cent. of the families are to a considerable degree Scotch-Irish; some are Scotch and some are Irish, and so we will go to the countries where Scotch-Irish blood comes from, and we will get some of their songs as legitimate song standards for our own country. The first thing I heard, crossing on the boat that took me north was a song that reminded me that the Irish people are a home-seeking, home-loving people. Oh, they are jolly on this side, and they are known as jokers and the men and women sometimes do the heavy work, and sometimes they do the politics (and perhaps that is heavy), and then sometimes they do the kind of thing that brings us up sharply: they do the thing that is so genuine that our hearts run right out, and that is the Irish song. The Irish song that I have in mind was sung by a boatload of Irish folks going home, going back to Ireland. I had first heard the old song years ago; everybody in the steerage knew it and they all joined in. I will sing a stanza of it, and you will all recognize it as a good, clean Irish song. Yesterday I heard the grind organ playing. I looked at the man and he was an Italian; I spoke to the man on the corner, who was listening, and he was a German, but they all knew that tune; it was "Kathleen." What does it mean? It is a home song, and a heart song, and it was written more than a hundred years ago, and while a simple ballad, it is a right kind of a song. Although an Irish-born song it has lived and will live because all nations love and sing it.

I had been on the boat seven days. I was with the others in the dining room the last night,—that is the night of the captain's dinner, and on that night we are all asked to sing our country's songs, and there, *that night,* I learned a lesson I like always to tell because it was distinctly a lesson to me. You know the substance of it already; but let me remind you. It was this way. The Germans were asked to sing, and oh, how they rolled out their song. The French sang their song, and it was as beautiful as silver trumpets, and everybody of the French folk knew it. It came time for the English and they all sang: "God save the King." Then came our turn, and we were the major part of the passengers. We all began to sing "America." We finished the first stanza, and tried the second, but some began the second and some began the fourth, and some began the third, and we giggled and looked at each other, and then we quit. I had training in singing and was going across the sea with my passport to protect me as an American citizen, but I could not sing America's National Hymn. I walked the deck afterwards with an Englishman, and this Englishman said to me something about the song which we *did not sing,* and I apologized or tried to: I said: "We don't sing it as frequently as you do." (You know they close their theaters and the like with "God save the King"), "And you know, we are a new country." He replied: "Yes, indeed, very very new, indeed." And I never since have apologized to an Englishman for not knowing America, every word and every stanza. I learned it, and on the return voyage we did not break down singing America.

But we are still on the boat, where an old priest has said to me: "So you are after songs,—then you must come to our country and come to our part of the country; it is the bonniest place in all Ireland." The song and the place was "Killarney." The man who drove me could drive, smoke, and sing at the same time, and I learned from him the genuineness of the Irish heart in singing folk songs. I learned that all Ireland knows her songs. I met an old turnpike keeper, (who also had his pipe,) and could talk and sing without removing it. He told me he had a lot of songs, and he began singing one, to which I said: "I know that." I remembered away back how I had learned it, how my oldest brother had brought it from college. The old man said: "Do you know Tom Moore?" He sang: "Those Evening Bells," and he pointed out the bells, and he said: "Tom Moore wrote the song right under the shadow of those bells." I was sorry to leave Ireland; a warmer-hearted people never lived and they have, know, and love their songs.

But let us cross into Scotland. We say that "blood is thicker than water." My mother is Scotch, and remembering the Tom Moore of Scotland,—"Bobby Burns," I went to the place where he is buried,—Dumfries. I was traveling in the care of the Kings Arms Hotels, and finding their bus at the station, I sat therein and looked about. Soon I saw two people, a tall lady and a little man, and the lady was evidently giving the little man orders. We later drove in silence to the hotel. I was shown to my room, and I thought nothing more about them. A little maid came up and asked me if I would not come down and have a cup of tea. I went down, and there I saw the tall lady and the little man. The lady said to me: "Will you have a walk with us?" And we started out. Now at home I am rather praised for my walking ability, but I walked and walked with the two strangers, in a strange country, six miles, and very few words were spoken all that while. Stopping finally, the woman turned to me and said: "Have you ever heard "Maxwelton's braes are bonny?" This is Maxwelton, and over there is the little church where he and I were married 28 years ago, and we went straight to Australia. We have just come back to the Islands, and I could not go back without coming to Maxwelton. Mind you it is the bonniest spot in all the world." (The priest had said that about Killarney). She turned to the little man, and said: "Sing," and he began to sing, and in the second stanza the wife joined. They sang the third stanza, both faces wet with tears. After they had finished, the lady said: "Do you like that song?" "Do you know it is the best love song in all the world?" She added: "Go to Edinburgh library and see for yourself." A few weeks later I was there, and saw its record: that for simplicity, chastity, and beautiful melody and words, "Annie Laurie" is the type of the world's sweetest love songs.

My friends, 62 per cent. of the songs that are written now-a-days are the songs that are written about what we call "love," and of that 62 per cent. 80 per cent. insinuate that the divorce court will take care of conditions that are not happy, "so don't be too serious." What kind of a song is that, and how does it compare with the song of "Annie Laurie" which is the typical, clean, fine love song? Only to-day I had a new bit of treasure regarding love songs, and "Annie Laurie" particularly. I talked with a woman who told me that her father, who was a British naval officer in the Crimean war, said that they all stood while over the trenches the boys all began to sing "Annie Laurie," and one of the men said: "I know she is *thinking* of me, too."

I would not leave Scotland in two hours if it were not wrong to keep you so long. But before leaving it I must tell you that in the north of Scotland, I discovered something more regarding our American song-making. The Kiltie band knew that I was there to learn Scotch songs, so with much pains they prepared a program. Thirty-nine Kilties sent me an invitation to come. After the marching and countermarching, the first song was begun,—a bitter disappointment to me, for it was not going to be Scotch at all. With much pains they had prepared an American program. I love American things, but they played for me, with all the appreciation of a thing done to please somebody else, what the leader told me was an American song, and I said: "No, no, no." But he was Scotch, and he said: "I ken it is." And what was the song? It was "After the Ball is Over," truly written by an American. You remember it, and so do I. Then they played a second song, and it was like unto the first. It was: "Hot time in the Old Town Tonight." And they began a third song, and at the close of it they said to me: "We learned that in Germany." I replied: "I think it is the best American song that we have." I wish to speak of it again in just a moment as the best American ballad. At this time the conviction came to me that at home, in America, there are some good songs, and I would go back and try to discover how new we are as a country and how far along we are in song building. So I came back, not forgetting as I passed London that there an American had immortalized himself by writing the best home song that was ever written,—"Mid Pleasures and Palaces," by John Howard Payne.

Hardly had I landed home before I wrote to President Theodore Roosevelt. I had heard that he had said: "If we are to have American songs we are going to have them through the old slave hymn of the South. The colored man is going to give us the basis for our best American songs." So I wrote to Mr. Roosevelt who directed me to get in touch with Booker T. Washington, who would direct my itinerary. I wrote immediately to Dr. Washington, and I said to him: "Will you help me to get the genuine old slave hymns of the South? He wrote back a letter beginning with a sentence that I shall never forget. He said: "*If you are sincere* I shall do all in my power to help you to get the old slave hymns." During that winter he helped me all he could; he told me where to go, to whom to go; he wrote letters ahead. The chief thing I got, let me say, was my own ability more or less to know what a real negro hymn is. I learned it through a very primitive camp meeting. Briefly it was this way. Four ministers arose, and they all preached from different texts, and it was a sort of a case of the "survival of the fittest," for one by one they dropped out, and the remaining one proceeded to sing the rest of his sermon, repeating his text as the main stanza, the audience composing and harmonizing the chorus.

At Farmers' Week at Cornell last year, after we had had had three or four days of talking and singing songs that live, one young man spoke to me. He was to be married next June, and he wanted to know about songs that would be good for his home. Together we made a list of songs with which to start the new home. Shortly after that an old man came to me. He was white of hair and white of face, and feeble of manner, and he said to me: "I like the songs you have been singing all week, but somehow my heart keeps turning to the home songs of the other land." The young man about to found his earthly home wanted the right sort of song. But the old man was thinking of what we call the Heavenly home, and he asked me: "Do you know: 'I've reached the land of corn and wine'?" He sang it, and I joined. He sang another song, and that song I love for it is simple and so much a song of my childhood. And last winter when at State College I asked the college boys if they knew it, few did. But we who did joined in singing it, and to them all I said my thought of why so simple an old hymn should be sung the world over. We here can sing it better, understanding it better. Let us all sing it. It is: "In the Sweet Bye and Bye."

There is yet another hymn which all the world knows and sings. Why? Because it is the prayer of the universaly heart,—simple but great. Written as the prayer of one soul trying to voice its need of Almighty aid it has become the hymn-prayer of all the world. Let us join in singing it: "Nearer my God to Thee."

Few there be of that great family of persons whose childhood lies well in the past who do not consciously realize from such an inheritance. A very few songs may constitute their riches and these of little intrinsic merit, a mother's bedtime croon, a father's simple old hymn, a family chorus or glee, some favorite from old days that association has kept. Yet no price could buy this heritage of song.

The sons and daughters of other lands, seeking better opportunities for living for themselves and for their children, cross to the American shore. In Pennsylvania are to be found thousands of men, women, and children whose native land lies far away from this new home of their adoption. Many families that thus bravely began home-building in a strange country brought with them very little of this world's goods, yet not one came without a heritage of song as a gift to the community into whose life the members of that family went to become citizens. In many instances we have heard the fathers and mothers in their farm homes,

"Sing to their sons those melodies,
Those songs their fathers sung."

How welcome such songs are with their age-long standards of loyalty and purity and truth! Songs that have lived years and centuries in the Old World because they sang of country, and home, and mother, and God, should go on living in the New World, singing of country, and home, and mother, and God. Richard of Saltoun said, "Let me write the songs of a nation and I care not who makes its laws." Sing the songs of the country whose blood you bring to America and you will help make the laws that must best govern song-making and song-singing in this "land of the free and home of the brave." If we are to become a music-loving nation, we must have American music; it must smack of our soil; it must embody the character and express the tendency and trend of American life; it must bear the marks of our weal and woe; it must show in strongly marked rhythms the effect of our developed and developing national energy; it must be the faithful interpreter of the true American.

Has the song lived? Will the song live? In addition to all technicalities of a song there is another, which we may call the test of personal possession. Does or will the song live for me, the individual? Has it a place in my life for reasons personal and of value to me? Has it had the power with me to suggest thought, action, habit, character? As memory, does it leave me unashamed and glad to recall it? Is it a song by which I shall be happy to have my children remember their home?

Are our home, school, community songs the bearers of good and imperishable associations? They may be recent, but more than likely they are "good songs to us because they are the songs of our early homes. They have stood the test of personal possession. These songs are the children's heritage songs, which through a long life they will respond to because child and song grew and lived together.

MEMBERS

OF THE

Pennsylvania State Board of Agriculture

FOR THE YEAR 1916

MEMBERS EX-OFFICIO

HON. MARTIN G. BRUMBAUGH, Governor.
HON. HENRY HOUCK, Secretary of Internal Affairs.
DR. N. C. SCHAEFFER, Superintendent of Public Instruction.
DR. EDWIN ERLE SPARKS, President of the State College.
HON. A. W. POWELL, Auditor General.
HON. CHARLES E. PATTON, Secretary of Agriculture.

APPOINTED BY THE GOVERNOR

Mrs. Jean Kane Foulke, West Chester, Chester County, ...Term expires 1917

APPOINTED BY THE PENNSYLVANIA STATE POULTRY SOCIETY

W. Theo. Wittman, ...Allentown,........................1917

APPOINTED BY THE PENNSYLVANIA BEE-KEEPERS' ASSOCIATION

E. A. Weimer, ...Lebanon, ...1918

ELECTED BY COUNTY AGRICULTURAL SOCIETIES.

			Term expires.
Adams,	A. I. Weidner,	Arendtsville,	1918
Allegheny,	C. L. Hood,	Coraopolis, R. D.,	1918
Armstrong,	S. S. Blyholder,	Kelly Station,	1917
Beaver,	Walter C. Dunlap,	West Bridgewater,	1917
Bedford,	Wm. F. Biddle,	Everett,	1918
Berks,	H. G. McGowan,	Geiger's Mills,	1919
Blair,	W. Frank Beck,	Altoona,	1917
Bradford,	Louis Piollet,	Wysox,	1919
Bucks,	B. Frank Wambold,	Sellersville,	1917
Butler,	Wm. H. Milliron,	Marwood,	1917
Cambria,	L. J. Bearer,	Hastings,	1919
Cameron,	R. P. Heilman,	Emporium,	1919
Carbon,	Edward Lienhard,	Mauch Chunk,	1917
Centre,	John A. Woodward,	Howard,	1918

			Terms expires.
Chester,	M. E. Conard,	Westgrove,	1918
Clarion,	J. H. Wilson,	Clarion,	1919
Clearfield,	T. L. Way,	Curwensville,	1919
Clinton,	Joel A. Herr,	Millhall,	1917
Columbia,	A. C. Creasy,	Bloomsburg, R. D.,	1919
Crawford,	W. F. Throop,	Espyville,	1918
Cumberland,			
Dauphin,	E. S. Keiper,	Middletown,	1917
Delaware,	Thos. H. Wittkorn,	Media,	1917
Elk,	John G. Schmidt,	St. Marys,	1919
Erie,	D. Warren De Rosay,	Corry,	1919
Fayette,	John T. Smith,	Dunbar,	1919
Forest,			
Franklin,	J. P. Young,	Marion,	1917
Fulton,	Frank Ranck,	Hancock, Md.,	1919
Greene,			
Huntingdon,	George G. Hutchison,	Warrior's Mark,	1918
Indiana,	S. C. George,	West Lebanon,	1919
Jefferson,	Peter B. Cowan,	Brookville,	1919
Juniata,	Matthew Rodgers,	Mexico,	1918
Lackawanna,	Horace Seamans,	Factoryville,	1919
Lancaster,	J. Aldus Herr,	Lancaster,	1917
Lawrence,	Doris L. Fulkman,	New Wilmington,	1919
Lebanon,	Edward Shuey,	Annville, R. D. 2,	1919
Lehigh,	P. S. Fenstermacher,	Allentown,	1918
Luzerne,	J. E. Hildebrant,	Dallas,	1918
Lycoming,	B. F. Kahler,	Hughesville,	1918
McKean,	E. A. Studholme,	Smethport,	1919
Mercer,	W. C. Black,	Mercer,	1917
Mifflin,	C. M. Smith,	Lewistown,	1919
Monroe,	F. S. Brong,	Saylorsburg,	1919
Montgomery,	John H. Schultz,	Norristown,	1917
Montour,	J. Miles Derr,	Milton, R. D.,	1919
Northampton,	C. S. Messinger,	Tatamy,	1918
Northumberland,	Wm. A. Fisher,	Milton,	1919
Perry,	Clark M. Bower,	Blain,	1919
Philadelphia,	David Rust,	Philadelphia,	1919
Pike,	B. F. Killam,	Paupack,	1918
Potter,			
Schuylkill,	John Shoener,	Orwigsburg,	1919
Snyder,			
Somerset,	Robert W. Lohr,	Boswell,	1917
Sullivan,	G. Eugene Bown,	Forksville,	1918
Susquehanna,	Dr. E. E. Tower,	Hallstead,	1919
Tioga,	C. H. DeWitt,	Mansfield,	1917
Union,	J. Newton Glover,	Vicksburg,	1917
Venango,	Homer C. Crawford,	Cooperstown,	1917
Warren,	R. J. Weld,	Sugargrove,	1917
Washington,	Jas. M. Paxton,	Houston,	1917
Wayne,	W. E. Perham,	Varden,	1917
Westmoreland,	W. F. Holtzer,	Greensburg,	1919
Wyoming,	G. A. Benson,	Tunkhannock,	1919
York,	Geo. F. Barnes,	Rossville,	1917

OFFICERS

PRESIDENT

Hon. Martin G. Brumbaugh, ...Harrisburg.

VICE PRESIDENTS

P. S. Fenstermacher, ...Allentown.
S. S. Blyholder, ...Kelly Station.
E. A. Studholme, ...Smethport.

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Matthew Rodgers, Chairman, ...Mexico.
W. F. Biddle, ...Everett.
J. Aldus Herr, ...Lancaster.
B. F. Killam, ...Paupack.
W. F. Throop, ...Espyville.
W. Frank Beck, ...Altoona.
Hon. H. G. McGowan, ...Geiger's Mills.
C. M. Bower, ...Blain.
Charles E. Patton, Secretary, Ex-officio, ...Harrisburg.

ADVISORY COMMITTEE

Joel A. Herr, Chairman,.......................................Millhall.
B. F. Killam, ...Paupack.
E. E. Tower, V. M. D., ...Hallstead.

LEGISLATIVE COMMITTEE

Hon. H. G. McGowan, Chairman,..............................Geiger's Mills.
C. H. DeWitt, ...Mansfield.
Hon. Robert W. Lohr,...Boswell.
Matthew Rodgers, ...Mexico.
George G. Hutchison, ...Warrior's Mark.

COMMITTEE ON RESOLUTIONS

J. Newton Glover, Chairman,...................................Vicksburg.
Col. John A. Woodward,.......................................Howard.
B. Frank Wambold, ...Sellersville.
John Shoener, ...Orwigsburg.
Louis Piolett, ...Wysox.

MEMORIAL COMMITTEE

Joel A. Herr, Chairman, ...Millhall.
C. M. Smith, ...Lewistown.
Col. John A. Woodward,.......................................Howard.

CONSULTING SPECIALISTS

Botanist,	Prof. F. D. Kern,	State College.
Pomologist,	Chester J. Tyson,	Floradale.
Chemist,	Dr. William Frear,	State College.
Vet. Surgeon,	Dr. C. J. Marshall,	Harrisburg.
Sanitarian,	Dr. S. G. Dixon,	Harrisburg.
Microscopist and Hygienist,	Prof. J. W. Kellogg,	Harrisburg.
Entomologist,	Prof. H. A. Surface,	Harrisburg.
Ornithologist,	Dr. Joseph Kalbfus,	Harrisburg.
Meteorologist,	Prof. W. G. Owens,	Lewisburg.
Apiarist,	H. C. Klinger,	Liverpool.
Economic Geologist,	Prof. Baird Halberstadt,	Pottsville.
Agricultural Geologist,	W. H. Stout,	Pinegrove.
Forests and Forestry,	Irvin C. Williams,	Harrisburg.
Feeding Stuffs,	G. G. Hutchison,	Warrior's Mark.
Soils and Crops,	Prof. Franklin Menges,	York.

STANDING COMMITTEES

CEREALS AND CEREAL CROPS

J. Aldus Herr, ... Lancaster.

ROADS AND ROAD LAWS

Col. John A. Woodward, ... Howard.

FRUIT AND FRUIT CULTURE

A. I. Weidner, ... Arendtsville.

DAIRY AND DAIRY PRODUCTS

R. J. Weld, ... Sugargrove.

FERTILIZERS

F. S. Brong, ... Saylorsburg.

WOOL AND TEXTILE FIBERS

Doris L. Fulkman, ... New Wilmington

LIVESTOCK

W. C. Black, ... Mercer.

POULTRY

W. Theo. Wittman, ... Allentown.

REPORT OF COMMITTEE ON CEREALS AND CEREAL CROPS

By EDWARD LEINHARD, *Chairman.*

The year 1915 shows a higher value in cereal crops produced than any former year. Wheat, corn, oats, rye and potatoes—a total of 6,104,695,000 bushels, with an estimated value of $3,504,129,000—was 5 per cent. higher than the crop of 1914 and 25 per cent. above the five year average. The increase in value of crops was due to the increase in number of bushels produced.

WHEAT

The premature reports of the enormous crop of wheat for 1915 has materialized as fully as predicted by the authorities at Washington, the total production for the country being 1,001,505,000 bushels, valued at $930,302,000. The number of bushels for this State is estimated at 24,928,000, produced on 1,312,000 acres, the average yield being 19 bushels per acre, while the yield for the United States is 16.9 bushels an acre, an increase of 2.3 bushels above the 5 year average. The price per bushel was 6.6 cents less than 1914—92 and 98.6 cents, respectively. The damage by the Hessian fly in this State was only about one-half as great as in 1914; over one-half of the counties being affected, Berks county suffering the most, about one-fourth of the crop being affected.

CORN

The estimated value of the corn crop was 1.8 per cent. more than for 1914. The total value of the crop for the country was $1,755,859,000. The average number of bushels per acre is 28.2 bushels per acre, with 108,321,000 acres seeded, producing a total of 3,054,535,000 bushels. This State produced 54,792,000 bushels on 1,522,000 acres. With an average of 36 bushels per acre it was 3 bushels less per acre than in 1914. This was due to the wet weather during the growing season interfering with necessary cultivation, especially on low grounds. Very little damage was done by frost; by the time that the first frost or freezing occurred, most of the corn had matured to such an extent that no extensive damage was done.

OATS

The oats crop for this country was 1,540,362,000 bushels with an average of 37.8 bushels per acre, or 8.1 bushels more per acre than in 1914 and 7.5 bushels above the five year average. Our State is 14th in the production of oats, having harvested 1,094,460 acres with an average of 39 bushels per acre, a total of 43,095,000 bushels and the estimated value $19,823,700.

RYE

The average production of rye in the State was about the same per acre as in the two previous years, 17.2 bushels per acre. The area harvested was 271,600 acres and the yield 4,672,000, the estimated value being $3,971,200. Pennsylvania ranks fourth in the production of rye; Wisconsin, Michigan and Minnesota leading in the order named.

BUCKWHEAT

The acreage of buckwheat was increased by 14,000 acres and the production 1.7 bushels less per acre than in 1914, and .1 bushel per acre less than the five year average. The estimated production of the country is 15,769,000 bushels. This State is first, with a yield of 5,540,000 bushels.

HAY

Hay ranks third in value compared with the other crops. The yield for the country—85,225,000 tons,—valued at $912,320,000, being an increase of $133,000,000 over the 1914 crop. This increase is due to the fact that there was 1,830,000 acres more in grass; also that the yield was increased by one-fourth ton per acre. The value per ton was 42 cents less than in 1914. The area cut for hay in this State was about 4 per cent. less than last year, producing a total of 3,558,000 tons, at an estimated value of $57,572,200. The Pennsylvania farmer should give more attention to the raising of grass, because it increases the fertility of the soil, especially when clover is raised.

POTATOES

Pennsylvania stands sixth in the production of potatoes. The average yield was only 72 bushels per acre, selling at an average price of 75 cents per bushel. The average yield for the country was 95.5 bushels per acre and the average price nearly 62 cents per bushel. About 22 per cent. of the crop in this State was affected by rot, ranging from 7 to 50 per cent. in different counties. The total production for this State was 20,502,000 bushels, being nearly 8,000,000 bushels short of 1914.

According to the fall report, the acreage sown to winter wheat is 11.3 less than the preceding year. The acreage of rye is 3 per cent. less than 1914. The condition of these crops are favorable throughout the country.

The average prices on all cereals, with the exception of potatoes, were less per bushel than in 1914, this being due to the enormous crops produced and high ocean freight rates on exports. During September, October and November, 1915, the rates on wheat from New York to Liverpool were 37.22 cents per bushel, or more than four times the average for the corresponding three months in 1914; also during this period—September, October and November, our exports show 10,000,000 bushels less than the corresponding three months of 1914, while Canadian exports show an increase of 58,000,000 bushels in the same time.

But, on the whole, it has been a good year for the American farmer. The valuation of the different crops is considerable above the five year average and an increase of 9 per cent. as compared with 1914, Statistics also show that the farmer has learned to rotate his crops so as to get legumes or clover crops in the rotation. Since the early 90's, the tendency of crop production has been upward, and for the past 25 years the production per acre of crops for the country has been increasing at the rate of nearly 1 per cent. per year. With the encouragement the farmer receives from the State and Nation, and the instruction from Agricultural institutions, the American farmer is learning how to farm.

REPORT OF COMMITTEE ON ROADS AND ROAD LAWS

By J. A. WOODWARD, *Chairman.*

At the Spring meeting of the State Board of Agriculture, at Lock Haven, in 1884, before your speaker was a member, he accepted the honor of an invitation to address that body upon the subject of "Country Roads," assigned him by the then Secretary, the lamented Thomas J. Edge. The change in the personnel of the body between that date and this is almost absolute—but a single member who then held a seat, remaining a member at this time: Reference is made to the venerable Joel A. Herr, of Clinton county. May many years be added to his useful life and membership.

The great majority of those who then composed the body, including every ex-officio and every appointive member, and the great secretary, have passed. The organization remains, more representative, more widely known, perhaps; but not more disinterested or efficient in the care and consideration it gives to the agricultural interests of the State than then.

The change in the component membership of this body is not more radical than is that in the road problem which it was then, for the first time, and is now, discussing, whether we think of those who build and use the road, or the volume and character of the traffic which it must accommodate; and doubtless the end is not yet in sight. Then, outside the cities and boroughs, and aside from the hoary and obsolete turnpike, "the road," as known throughout the State, was the common dirt road, the township road, the country road. The traffic upon it was in comparatively light loads, horses drawn at a speed of from two to ten miles per hour, and for short distances.

The construction and maintenance of it had for its highest authority and directing force the township supervisor, which title was only too often a synonym for inefficiency, or "unpreparedness," to borrow a word from present day political discussions; and who was for the period of his official life, a fine example of absolutism and autocracy over all road matters within his district, and within legally defined limits. He levied a certain or uncertain amount of tax upon his neighbors, who congregated at a designated point at his call and 'worked out the tax," with no standard to guide and no authority to judge, other than that of the autocratic supervisor. Down to 1887, no tax payable in money could be levied nor collected except by order of the county court to pay an obligation already incurred for some special purpose. In that year it was written—see pamphlet Laws, 1887, Act No. 140—that the supervisors "may, and they are hereby authorized to collect, annually, in cash, not exceeding twenty-five per centum of the rates for the purchase of implements and materials as may be found necessary;" and your speaker had the valued honor of aiding in the enactment of that law, and personally amending it by the introduction of the word "materials," that a supervisor might, in time of dire need, purchase and pay for a plank or bit of timber with which to patch a broken down bridge across a little run, or buy a pick handle of a store-keeper who did not happen to be a tax payer in the same road district.

This is a brief summary of the legal machinery, power and resources for making and maintaining the one hundred thousand miles—I am using round numbers—of Pennsylvania's country roads until within the period of a single generation.

The highest types of road known were the McAdam and the Telford, which was simply a solid base for the McAdam where needed, and in a general way they were well guarded by toll gates. That a considerable number of these moss-grown relics of pioneer days remain is a serious reflection upon the practical, common sense business qualifications of the people of Pennsylvania.

Now, the buggy, carriage or coach, of light weight and horse-speed, is largely superceded by the self-driven, heavy automobile going at twelve toforty miles an hour. The old, lofty Conestoga wagon, with its broad tires contributing to the permanence of the road upon which it traveled at two to three miles per hour, has given way to the ten to twenty ton truck at fifteen to twenty miles per hour.

These changes have reduced the McAdam and Telford types of road to second and third class, and made the archaic medley of old time road laws "mere scraps of paper." The road supervisor has been shorn of his autocracy, and becomes an adjunct of a State Department of Highways; and the old country road beginning at the borough line and extending to the suburban turnpike. Here let us halt.

Its efficient and available substitute, the new highway that will sustain and repel the attacks of the new, exacting and aggressive traffic, has not yet been discovered, and it is not the function of this Board, nor of its Committee to discover it. This is one of the first and most important duties of the Department of Highways. It is clothed with abundant power to secure, and equipped with funds *ad libitum* to pay for, the services of engineers and scientists whose high attainments are doubtless equal to the task. That a road which will successfully withstand the assaults of this wonderful engine of destruction can be made goes without saying; but to this time it has not been made excepting at such large costs as to make it unavailable under present conditions.

The one plain fact is that the whole public road theme, (indeed the whole subject of transportation in its largest dimensions) from the mud road to the Lincoln Highway, from the township supervisor to the State Highway Commissioner, from the two-mill tax to the fifty million dollar bond issue; from the wheelbarrow to the luxurious touring car or my lady's $10,000 limousine, is in a state of evolution.

The transportation of any and everything, which is transportable, from a thought to an army, must, in this day and generation, be conducted at top-notch speed. Whether it be hurled across a continent, forced over or under the seas, or flung through the air, the movement must as nearly as possible annihilate time and space, and the multiplied and complex problems of transportation involved are the most important ones which we, as state or nation can consider, excepting, possibly, the German, or our own, submarine. The relatively small section of this tremendous whole, as bounded by the title "Roads and Road Laws of Pennsylvania," covering an hundred thousand miles of public roads, and almost as many miles, if they might be measured in miles, of complex, overlapping, and often illy considered road laws, whose most prominent characteristic is their intricate verbosity, which is at present before us, is far too large to be more than glanced over in a paper of this kind.

Let it be briefly said that the wonderful changes in both the Roads and Road Laws of Pennsylvania, which have occurred in the third of a century since this body first took cognizance of the road question, have been steadily and rapidly though not uniformly, in the direction of improvement; and the modifications in the traffic which they permit and encourage have, in a general way, added very largely to the sum total of comfort, convenience and pleasure of the people.

As an agency in the advancement of civilization, easy, comfortable, rapid, safe and cheap transportation holds a place, than which none other holds a greater; and it is a subject of gratulation that in all of these qualifications the roads of Pennsylvania have made substantial progress within the period named. In the main, our legislation has been propitious, and its administration might easily have been worse though neither has been by any means, above criticism. In speaking thus your Committee has reference to all road laws and to all road administrations, from the youngest and most inexperienced supervisor in Podunk township to the chief highwayman, and is not knocking.

The promise for a more rapid progress in good roads is bright. The general public has learned much and is learning faster than ever before. A larger proportion of the people than ever before know what good roads are, and have a deep sense and wide-spread realization of their urgent need of it, and when the people get so far as this in knowledge, they will soon get farther and know how to get what they need.

The recognition of our law-making bodies of the necessity for the utilization of the highest possible degree of science and skill, and of a centralized control, in the furtherance of the good roads project, is evidenced by the erection of a Department of Highways, and the large powers and somewhat liberal appropriations with which they have imbued it. Notwithstanding the considerable current of adverse criticism which has been directed against it, some of which doubtless has been well earned, your Committee desires to express its confident hope and belief that through its agency there will ultimately come about, gradually improving in quality and decreasing in cost, a realization of the road users dream; a large percentage of the more important roads of the State, equitably apportioned—typified by the present system of inter-county State Highways—which shall be of easy grade, safely guarded at dangerous places, dry and smooth at all seasons of the year, hard enough to withstand the attacks of the fastest, and sufficiently well based to endure without flinching the impact of the heaviest traffic to which it may be submitted. A large proposition? Yes! But if there is any state in the Union that has the science, skill, money and material to solve it, Pennsylvania is that state. And the Department of Highways is our agency for the application of these splendid facilities to the solution of the problem. While it may not be the best possible agency for the purpose it is the only one we have or are likely to have. It is here, it has been here long enough to be settled in its bearings, and it is here to stay.

Now let us make the best possible use of it. If, in years gone by—whether with or without reason does not matter now—it lost our confidence to such a degree that we refused to give it the fifty millions it asked for with which to do a part of this big job, and is now making honest and energetic efforts to regain that confidence, let us meet it half way, and a little more; and when it has shown, like the Missouri mule, that it can and will be real good, we will authorize the bond issue and buy the bonds ourselves. We can do it as easy as turn our hands. Something less than a century ago, when we were comparatively young and poor, we wanted better transportation facilities quite as much as we do now, and in that day canals were the best things we knew, so we undertook a system of water ways—low ways, if your please—and we authorized a bond issue of forty millions and built them through a commission. They served their purpose, were superceded by the railways, went into a condition of "innocuous desuetude," and the bonds were all paid off long ago, no one being the worse for it. We can do far more than that now and not half try. It is up to the Department to show us that it will discreetly and honestly spend, on this inter-county highway, eight or nine thousand miles long, with a fair share to the township road, and it can have the money, and we will all have the roads.

But what of this eighty or ninety thousand miles of township road, dirt road, just road, and sometimes hardly that? The road that we farmers used to get out to and connect up with the (sometimes twenty-two-thousand-dollars-per-mile) intercounty highway? That's the road which this body, representing the farmers of every county of the State, is most concerned with. The road that takes our produce to the railway station and the market; and ourselves and our families to school and to church and to the polls; the road the R. F. D. man uses to bring us our mail; the road that we use and that is used for us three hundred and sixty-five days every year; and over which, when in days unnumbered we are carried to the bit of green sward "by the little brown church in the vale."

The road system of state, or nation, for that matter, may well be compared to the arterial system of our bodies; The main arteries carrying the traffic of blood to the several main sections of the body are first to be considered of course, in order to establish the system, but the smaller and more distant ones, even smallest and most distant ones, those which supply the constant needs of the skin, hair, nails, away at the outermost boundaries of the frame, are equally important with the larger ones to the welfare of the whole body; and if they are permitted to get out of order or fail in any degree to perform their functions, to that same degree the whole system suffers. So with the township dirt road; it is quite as important to the welfare and prosperity of the whole State as is the inter-county highway, and must be maintained in the same relative degree of excellence. It must be smooth, dry and hard for at least ten months of the year, excepting only the periods of Spring thaws and excessive rains. How shall this be done? By road laws? Witness the failure of the hundreds and hundreds of laws enacted during the dead century, and now reposing deservedly in the scrap heap. By the autocracy of the unequipped supervisor? His inefficiency has been fully demonstrated. By "working out the road tax?" Enough has already been wasted in Pennsylvania by this egregious folly to duplicate the Appian Way from Philadelphia to Erie.

State aid, in science, skill and money, properly understood, broadly interpreted, liberally applied, is at this time the best available instrumentality in sight. State aid, I say, not State assumption nor substitution. The local forces of men and means must be aided, not cut out. The township unit should remain: it is the best road district, under present conditions that can be made; and all its inherent powers be utilized to the best possible advantage. The old time supervisor, too often unqualified and always independent in action, has already been superceded by the act of April 12, 1905, by an organized Board of Supervisors, three in number. This body is continuous in its structure by the election of one at a time, acts as a board, and, usually one or more of the best qualified citizens of the township in its membership serves as a most valuable agency for connecting up the Department of Highways and its organized science, skill and funds with the township road.

By the act of July 22, 1913, a suzerainty over the township supervisors by the Department of Highways, which makes the direct connections referred to above, and re-enacts the act of April 12, 1905, with such modifications and amplifications as establish a workability between the State and township authorities was authorized. To some of the provisions of this act exceptions might be taken by those disposed to be critical. Your Committee is not so disposed, because it establishes the principle of unity of purpose, action and forces between all the road authorities and powers of the State, and provides the legal machinery, under centralized and intelligent control, your Committee ignores its defects—which may be many but are remediable by amendatory legislation—and gives it full commendation. As a matter of fact the act has already been amended as to sections 5, 9 and 15, by the present legislature.

Your Committee is not unaware that this view of the interelation of State and local authorities and laws is diametrically contravened by some of our thoughtful citizens; and it acknowledges with very high appreciation the receipt of letters from a prominent citizen and distinguished lawyer in the southwestern part of the State, whose opinions upon the subject are the more particularly entitled to the highest respect because he has his country home in a township in which there are nearly 200 miles of township roads, who strongly inclines to this opposing view. Notwithstanding this, your Committee believes that a half century of constant use and close observance of the country road, with no inconsiderable effort toward the solution of the economic and practical questions involved, added to a more or less studious attitude toward the annual and biennial output of legislation relating thereto, justifies it in the conception above expressed.

In conclusion, Pennsylvania roads constitute the biggest proposition the State has on hand, from whatever point of view may be taken, requiring tremendous outlays of labor, money, time and patience for its accomplishment, and the one thing for everybody concerned to do is push, not kick.

REPORT OF COMMITTEE ON FRUIT AND FRUIT CULTURE

By E. A. STUDHOLME, *Chairman.*

The year 1915 has been a very profitable one to the fruit growers in some sections of the State, while in other sections the fruit crop was almost a total failure. Reports from some counties show that the heavy frosts of May 26, 27 and 28 killed practically all the fruit, while in the other counties that escaped the late frost the yield was good. This is especially true in regards to the peach crop. Fortunately the counties where most of the peaches are grown in this State did not suffer from the frost and the yield in these counties was very large.

This condition in the State brought very forcibly to our attention the need of better facilities in marketing our crops. In some sections the peach crop was left to rot on the ground, while in other sections they were commanding a high price. This is one of the big problems confronting the fruit grower.

It has been often stated that if we were to eliminate the middleman, the problem of getting our produce to the consumer, with the least amount of loss to both parties, would be solved. In some cases no doubt this is true, but we must have some method of distribution and where the middleman performs a service he is entitled to a fair compensation for that work. As in most lines of business we have the honest and the dishonest commission men; so have we the honest and dishonest fruit growers. The barrel of apples with the good ones on top and bottom, but with poor specimens in the middle is still with us, and as long as this condition exists we should not expect to have saints in the commission houses.

The greatest need to the fruit growing business in this State, at present, along legislative lines, is for a law compelling every shipper to mark his name and address on every package he ships, with the grade and minimum size of the fruit contained in the package. This law is sure to come sooner or later in this State as it is already in operation in other states, and the right source from which it should come is from the fruit growers themselves.

The thousands of young trees coming into bearing will mean closer competition and the fruit grower who pays close attention to the grading and packing of his fruit will be the one to make a success of his business. Situated in the heart of the fruit growing section, with the best markets in the country for our products, there need be no fear of over production of the best quality of fruit in the State. To capture the markets for our own products, all we need is closer attention to the appearance of our package, as we already have the quality of fruit to put in the package.

The future of the fruit business is the same as the future of any other business, we will have good years and bad years, but the fruit grower who will pay close attention to his business, who will retain his enthusiasm in the years of low prices, using the best methods of producing and marketing his crops will surely make a success in the fruit business as he would in any other line of business.

REPORT OF THE BOTANIST

By PROF. F. D. KERN, *State College, Pa.*

The chief problems of a botanical nature in which the members of this Board are interested are without much doubt the eradication of weeds and the control of plant diseases. The year 1915 did not develop any unusual situations regarding weeds. There was the usual correspondence from all parts of the State asking for identifications and suggestions as to methods of extermination. In the report a year ago the speaker referred to weeds and considerable interest was manifested in the subject. Perhaps it may be well to mention specifically some of the weeds which were inquired about most during the past year.

Yellow or Hop Clover was received for identification from numerous correspondents from ten or more counties. The scientific name is *Trifolium agrarium.* This is an annual plant which has been introduced from Europe. Its seeds are doubtless distributed as impurities through those of the larger clovers. It is a soil enricher as all the clovers are and can scarcely be called a weed, although one finds mention of it usually in that connection. Its bright yellow flowers are conspicuous and attract the attention of those not familiar with it. It is not new in the State, as mention of its occurrence may be found in the Report of the Botanist, Dr.

Buckhout, for 1903. It has been tried as a forage plant in some places but apparently without much success, and since it usually is possible to employ larger and better forage plants there does not seem to be much of a future for it. On more sandy soils where there are no better clovers, there might be a possibility of using it to advantage. Where it is looked upon as a weed it can be controlled by preventing seed development through early and frequent cutting. Clover and grass seeds should be watched carefully as it is through them that such plants as this are distributed.

Yellow Melilot or Yellow Sweet Clover *(Meliltous officinalis)* also attracted attention and was sent in several times. It is very similar to the ordinary white form *(Melilotus alba)* except in color, but occurs more sparingly. There is also considerable question about classing either of these forms as weeds.

An interesting sample of a tough wiry grass was received through the office of Secretary Critchfield. It was without heads, but by comparison with a similar form on the campus at State College, it was finally determined as Sheep's Fescue, botanically known as *Festuca ovina.* It belongs to the same genus as Meadow Fescue which is commonly cultivated as a meadow and pasture grass. The Sheep's Fescue is said to be used in some places in this country in pasture mixtures for sterile soils, but from our observations, we would classify it as an undesirable form. It has a curious habit of growing in tufts and dying at the center as it spreads in all directions.

Numerous reports were received of an annual plant, which has been introduced from South America, known as *Galinsoga.* If it has any other common name I am not familiar with it. It is reported as troublesome especially in gardens. The stem grows up to one or two feet and is much branched. The heads are small, about one-quarter inch broad, and have yellow centers with white rays. Every effort should be made to prevent it from going to seed. It has a shallow root and is easily pulled. In cultivated ground it is usually not troublesome as it cannot stand the tillage given the crop.

From the point of view of plant diseases, the season was marked by one or two epidemics worthy of especial mention. Fire blight, or pear blight, on apples and pears was much more severe than usual. It is present and does some damage every year. The explanation of the unusual development this year is to be sought in the nature of the season. The cool, wet weather prolonged the growing season for the trees and the time during which the blight worked injury was much extended; in fact it was present nearly the whole season, whereas, it is usually checked by the maturing of the woody tissues about mid-season. Fire-blight was bad in the other apple growing states of the East and there is at present a movement looking toward a national conference on the subject to consider methods of control and investigation.

The potato crop was affected by diseases in a very serious way during the past season. In this connection a brief reference may be made to what is known as the *Rhizoctonia* disease of potatoes. Although the fungus causing the disease has been known in the State, this is the first season, so far as the speaker is aware, that it has been recognized as a factor in the production of disease of economic importance. The fungus works several types of injury to the potato and the plant. The main type, and the one by which it is best known, is the "black speck" or "black speck scab" stage. These hard, black specks adhere to the tubers and appear like particles of soil; but are really made up of threads of the fungus which serve as a means of carrying it over winter. The fungus also causes a scabby or corky condition of the tubers, a rot of the tubers and roots and secondary effects known as little potato and aerial potato. Sufficient of these forms were observed to make it evident that this disease must be considered seriously. It is caused by a soil organism and without doubt climatic conditions have much to do with its development, although it is not known what factors favor the diverse forms which it assumes. General methods of control can scarcely be suggested at this time. The variety, character of the soil and climatic conditions, together with the different manifestations of disease make the problem a difficult one. If it is desired to disinfect the tubers, corrosive sublimate must be used since formaldehyde as used for common scab is not effective. Rotation of crops with as long a time as possible between crops of potatoes is desirable. It should be said also that it is not possible to state what the future of the disease may be with the variable nature of our weather conditions. The late blight caused by the fungus known as *Phytophthora infestans* destroyed perhaps one-half of the potato crop in 1915. Other epidemics are known to have occurred in 1910 and 1891. It is well known that the season was marked by excessive rainfall and unusually low temperatures. The amount of precipitation and atmospheric temperatures seem not to be sufficient to explain outbreaks of the late blight, and investigation has led Professor Orton, of State College, to the belief that low soil temperature combined with high relative humidity at the proper time, late July and August, are probably the most important factors favoring the development of the disease.

An unusual outbreak of late blight also occurred on the tomato, caused by the same fungus which affects the potato. It is not known how general this outbreak may have been but it was observed in the central part of the State and was prevalent especially on the College farm, where the crop was practically destroyed. In America the disease has been known to cause losses to tomatoes in California and Virginia and has been reported also from Maine, Connecticut and Massachusetts, but has not been reported previously in Pennsylvania. No record of varietal resistance was kept but all of the thirty-nine varieties grown in the experimental plats were affected to some extent and the crop was almost a total failure. The fungus attacks leaves, stems, and fruits with about equal virulence.

Apple rust was bad in the southeastern sections and is without doubt increasing in importance from year to year. The white pine blister rust is known to persist within the State. Inspections have shown that it has been imported into seven different plantations but the effectiveness of the attempts to eradicate it are unknown. Numerous other plant diseases might be mentioned, but time does not permit of their discussion.

ADDRESS OF GOVERNOR BRUMBAUGH

Mr. Chairman and Gentlemen: I had the pleasure a year ago, at the meeting of your body, to speak briefly to you down in the other part of the city. We have now passed through one year of our work and are up here onthe Hill and it is a peculiar source of pleasure and of gratitude to me that we can meet under the peaceful and satisfactory auspices that surround us here this beautiful morning in our Capitol Building. You gather from all parts of Pennsylvania; each of you knows in a very intimate way some one section of this great imperial Commonwealth, and if in some way we could build together what each one knows and make out of it a composite picture representing what all of us know, there would arise in our souls a picture of the finest Commonwealth that God ever set in the world. That is your heritage and mine, and it is a source of gratitude just to be born and to live in as fine a state as Pennsylvania, and I should like, this morning, first of all, to impress upon you the fact that Pennsylvania is a fine, splendid place in which to live, in which to rear your children and in which to perform your daily duties. Don't get into your soul the thought that by migrating elsewhere you could largely improve your conditions. It is incumbent upon you and incumbent upon me to make the conditions here in Pennsylvania so fine that we will all be glad to stay and to welcome others to help build up our great Commonwealth. (Applause) It may be known to you, I think it ought to be, that during this year it has been my conscientious endeavor to try to improve the agricultural conditions of Pennsylvania because her soil is her permanent and splendid asset; not what is under it, but what it itself is and that which springs from it under the care and cultivation of wise and prudent men in Pennsylvania. Now anything that we can do, as a people, in our organized and official capacity, we ought to do to increase the returns, the rewards of industry upon the soil of Pennsylvania. Substantially 11% of all our people are farmers, are engaged in this occupation of producing food for the other part of our population. The number is too small and there should be an increase in the number of people who cultivate the soil of Pennsylvania.

That is a serious matter to which you have turned in one way or another probably during all the years with which you have had to do officially with that problem. So long as we buy food in large quantities from outside the Commonwealth, so long as our people are dependent upon foreign markets for the food to sustain them in their daily toil, we are not working Pennsylvania to its maximum service to itself, so that anything that we can do that would improve that condition ought to commend itself in a very definite and in a very practical way to all of us.

Just in a word. I was convinced a year ago and I still entertain the thought that if we can put good roads to the farms of Pennsylvania so that it will be easy to transport the crops to the market, that within itself is an important service, and I submit to you, conversant as you are with the several neighborhoods of the State, that we have actually done something in that direction and we shall do more as the years go by. We have also had passed and put into operation a new law, in a way, re-organizing the Department of Agriculture here at the Capitol, and I have the very great satisfaction of my soul to say that we have put at the head of that department a most capable, a most conscientious, and splendid man, Mr. Patton, (applause) who is not only interested in everything that makes for better farm conditions in your Commonwealth, but who has the judgment, the insight, the executive capacity to help you in definite ways to that end.

Now, further than that, there is a matter which I think none of you have as yet sensed. We have put in operation here in Pennsylvania a Workmen's Compensation Law, which, by a special act of Assembly, excludes—I mean, a child labor law—which excludes farm labor and domestic service from its provisions just as the Workmen's Compensation Law does. I wonder if you have thought what that means, whether you have analyzed the far-reaching purpose bedded deep in that child labor provision? It is a definite attempt on the part of the Executive and his friends and the friends of the childhood of the State to make it easy for boys to stay on the farm and in the home, where they ought to be, instead of flocking to the industries at a premature age to try to earn a small pittance which fixes them as cheap toilers all their lives in our villages and manufatcuring centers. You will know more of that as the years go by and see the wisdom in the operation of that law.

Now I am interested also in another phase of this problem which your Board of Agriculture and your Commissioner of Agriculture will be working out with your co-operation and help, I trust, during the coming year. It is not enough to grow your crops, we have got to see that these crops find a ready and a good market and the marketing facilities for the farm crops of Pennsylvania are so very much below what they ought to be, that every man in this State who is interested in it's welfare ought to give serious support to a movement that will increase the marketing conditions and facilities of Pennsylvania. (Applause.) We ought to make a complete survey of our soil and advise our people in a definite way as to the method of treating it and caring for it and securing from it its maximum return for the efforts put upon it.

There is another matter in which I am deeply interested. I believe that this Department of Agriculture should have, and I think in the near future it will have, an expert man or woman who will be able to go to a farmer who sends for him just with a postal card, and, without cost to the farmer, advise him upon everything in which he is concerned for the betterment of his family and his property in Pennsylvania.

Now, having in mind at least three things in that which have all come to my attention because of my study of the State in recent years, first of all, to see to it that the drainage from our barns does not reach the source of water that our families consume. Now, that may seem a small matter to you, and yet there are farms in this State today whose buildings are so located that the menace from typhoid fever is an increasing one by reason of the improper location of the buildings, and it is infinitely better, gentlemen, that the Commonwealth should have a pound of prevention rather than a ton of cure in matters of health and the preservation of human life.

Now the second thing would be to work out the problem on that farm of reducing the effort of performing the farm duties to a minimum. I know farms in Pennsylvania where the women and children and indeed the farmer himself, are practically worn out at the end of the day because they have to walk three or four times as far as necessary to perform the duties around the buildings morning and evening. The thought of that! Economy in steps means economy in energy, in strength, and therefore increased efficiency on the farm. And then I should like also to have some attention paid to the setting of a man's farm property so that when he wants to sell his property, it will appeal to the purchaser not only as a desirable thing from the point of view of its productiveness and from its accessibility, but from the point of view of its appearance to himself and to his friends as they travel to and fro before it. Some of our beautiful farm buildings in this State are sources of great pride to us, and some of them are so forbidding and ugly and unsanitary that it is a positive shame to look upon them or to note that they exist in this great Commonwealth. (Applause.) Nobody is to blame for that condition; it is an inherited thing, something that we have gone on and done and done and done, each man in his own way, by the best light that he possesses. The Commonwealth ought to come in there and without one cent of expense to the farmer give him scientific guidance in producing maximum satisfaction in the treatment of his farm buildings and farm property. If we can do that, we will have done something worth while.

Finally, because I must not trespass upon your time, I have in mind another thing I want to lay before you. Last year, after four months of rather earnest effort on the part of the Highway Department putting our roads in condition that was at least as satisfactory as the money at our command would permit, we organized a thousand mile tour in Pennsylvania to see our highways, and we actually carried people on that tour who did not believe that Pennsylvania had that many miles of good roads, and we had to, mile by mile, work that thought into their systems until it became a fixed and demonstrated fact that it was true. The truth about the matter is, that next to the State of New York, Pennsylvania has the largest mileage of good roads of any state in this Union and she has built them without a dollar of bonded indebtedness upon the Commonwealth. (Applause.) Now we are going to increase that amount of mileage and we are trying, with all the energy and skill and honesty that we possess, to make the money of the people count in the road problem.

Now what would you think and how would it appeal to you good people if, next Autumn, instead of going out on a road observation tour, some of us would organize a party and come out and see what kind of apples you have grown in Pennsylvania? (Applause.) What kind of pigs you have got on your farms in Pennsylvania, and what kind of corn you are growing in Pennsylvania, and what kind of babies you are rearing in your homes? (Applause.) And bring the whole administrative side of your Commonwealth service into sympathetic touch with the man on the farm, who is the prince of Pennsylvania, who is actually making good, in a modest way, on a little bit of God's green earth. I'd like to see that man; wouldn't you? And I believe that a plan of that sort, properly worked out, would call the attention of our whole population to our farm conditions in Pennsylvania, would result in all the necessary remedial legislation that we have a right to seek, and start this work under Secretary Patton and the new Commission on a road of development and of progress and of health to the farmers of Pennsylvania in a way better than any other that I can conceive of. If you know of a better thing to do, if you think of a better plan, let us have it, we want it.

Now, finally, therefore, this being all, sums itself up into the one thought in my soul. I want the service of the Commonwealth, for which I am in a large measure responsible, to make good on the soil of Pennsylvania, to count in the increase of the crops of the farmers of Pennsylvania, to count in the cheapening of the cost of food in the congested centers of our population, and to bring about such a co-operation and sympathy between the rural and the urban populations of the Commonwealth that every thing that counts for the good of one shall count for the betterment of the other; that we shall build up here in Pennsylvania a solidarity of population and a sympathy and co-operation that will make all of us increasingly proud of the grand old Commonwealth that God has put in our hands to care for. Thank you very kindly for your courtesy this morning. (Applause.)

REPORT OF POMOLOGIST FOR 1915

By CHESTER J. TYSON

Your Pomologist is again confronted with the problem of making a report that will be of some value to the Board, at the same time coming within the scope of his observation and knowledge. There has been neither provision nor opportunity for extended survey or research, and this raises the question whether a purely scientific Pomologist, with research material at hand, might not better serve the Board than a plain apple grower can do. The report of the apple grower is bound to review the business rather than the science of Pomology. Moreover, the commercial apple grower finds it nearly impossible to confine his observations to conditions in Pennsylvania alone. The subject is so broad and the scope of the business is so far reaching, that state lines cannot bound it. So closely are the interests of the different sections interwoven, and so generally are the same large markets used by all, that general consideration of country-wide conditions seems wise and most likely to bear fruit.

The 1915 crop was a hard one to estimate in advance and nearly as hard to review. Several influences have contributed to bring about these results.

As noted in former reports to this Board, there has been a widespread epidemic of apple planting, beginning nearly fifteen years ago, reaching its height 4 years ago, and decreasing to the present time. Millions of trees have been planted, most of them in rather well defined and long established apple sections, but in many cases entirely new orchard sections have been developed to a really tremendous degree, notably some of the mountain districts of southern Pennsylvania, western Maryland and West Virginia. Still other plantings, some of them really very large and aggregating numbers almost beyond conception, have been located here and there throughout the whole country, including Canada. These new orchards are beginning to bear in such numbers that no crop estimate is of any value unless it figures them as a considerable part of the whole and none of the crop estimating machinery now in use seems to be equipped to consider these outlying, heretofore unreported sections at all.

Local Spring frosts put some sections entirely out of business, giving the impression of a crop failure, while only a few miles away there may have been no frost and a heavy crop resulting.

Pear blight, on apple, particularly the blossom form, was more prevalent than usual, in many cases actually destroying the crop; while in other cases the only result was to thin the setting of fruit and leave plenty for an abundant crop. General report, however, pronounced a crop failure throughout the whole southern section where blight was common this year.

A still further difficulty encountered in crop estimating, is the feeling on the part of many growers, fostered by various organizations and publications, as well as by some public officials, that it will be to their advantage to have the crop underestimated, thus making it most difficult to get a true report from the very people who are best able to give the facts. This is a form of dishonesty that is hard to understand, for in the end it deceives no one quite so much as the growers who practice it. Further development of this report will perhaps make this point clear.

Various estimates of growers' associations, apple dealers' organizations and the Division of Markets of the United States Department of Agriculture, placed the 1915 crop at from 60% to 80% of the 1914 crop which was a very large one. Stress was laid on the improved industrial condition of the country.

Now, apple buyers as a class, have a peculiar characteristic. Contrary to the common belief, they are easily deceived in the matter of an apple crop, for they want to believe that good prices are ahead and lend willing ears to just such reports as were common the past season. This was the result. Apple buyers were active, competition among them was keen and in the end all the apples that could be bought in the large commercial sections were put under contract at from $2.50 to $3.00 per barrel f. o. b. for the No. 1 fruit. Now, there was no market in the whole country that would warrant these prices during the months of harvesting, but the dealers felt that the future was safe, with this result: On January 1, the storage houses of the country contained nearly one hundred thousand barrels more apples than at the same date one year ago, bought or held at prices that no market has been willing to pay up to this time. Apples have been held for higher prices with the hope of coming out whole. Consumption, quickly affected by advancing prices, has been curtailed, and most dealers have now given up all hope of avoiding a loss. The trade in general—will come up to the next buying season feeling that the growers owe them something which they will proceed to take if they can. Growers who did not sell at harvest times are of course meeting the same market conditions as the men who invested in fruits, and like them, are now suffering the result of under-estimating and over-valuing the crop.

Conditions are changing in the marketing of apples, as in most other lines of commerce. Comparatively few years have passed since it was unusual to keep apples through the winter under refrigeration. The value of a barrel of apples at harvest time in those days was the price it would net if shipped to market and sold. There was no speculative buying, consequently no need of crop estimates. Today nearly all winter apples are either sold to a dealer who speculates on future values, or held by the grower in case his estimate of future worth is higher than the price he is offered at shipping time. This makes it exceedingly important to have at hand the best available information as to the quantity and quality of the crop to be marketed, and the business condition of the country that is later expected to buy and consume the fruit.

I have developed these details with the hope of emphasizing the importance and value of a real crop estimate, and the dangers that accompany under as well as over estimating. From time to time you will be called upon to contribute to the information on which these estimates are based. I would urge that you make your reports as nearly as you can in accordance with the facts and that you bear in mind, always, the ever increasing number of new orchards just beginning to bear.

Perhaps we cannot use our remaining few moments to better advantage than by calling attention to the great changes that are being made in the harvesting and packing of the apple crop. Not many years ago, and most of you will remember it, the common practice was to pick the apples in great piles in the orchard, piling them on straw to keep them clean and usually covering the apples with corn fodder to prevent sun scalding.

Next followed the practice of pouring the apples direct from the trees on packing tables and running them into barrels ready for market. This was a great improvement over the former plan for it made less work; it avoided ripening and decay and it put the apples into the barrels clean and fresh as they came from the tree. Still greater changes are now taking place, and each year more and more of the larger growers are building packing houses and are bringing all of their apples together under one roof for the purpose of grading and packing. They find that, including the cost of hauling, they can do much cheaper packing, and can do far better work than ever was possible in the orchard. This change has also opened up the possibility of mechanical grading, and not a few growers have installed machines to accurately assort their apples into several uniform sizes for packing.

While being neither a prophet nor the son of a prophet, your Pomologist does register his guess that ten years from now, perhaps much less, will see apples as generally and as carefully sized as we now see practiced with oranges. The buying public will demand it and it will pay to meet the demand.

FERTILIZER CONDITIONS AND OUTLOOK: THE SYSTEM OF VALUATION.

By DR. WM. FREAR, *Chemist.*

The fertilizer situation in America is a beautiful example of the close commercial interdependence of the nations of the world. As soon as the European War began, export demand raised the prices of our grain crops, our draught animals and presently of our cotton. Then followed a heavy demand on our metal supplies, our automobiles, and then upon our chemical resources. Old factories were reopened and new factories of vast area were hastily built, and the land was literally scraped to create the raw material stocks from which the vast demand for finished chemical products, munitions and medicines, might be supplied.

At once, the merchant fleets of Germany were gathered into safe harbors at home and in neutral ports; and a large fraction of England's transportation facilities were diverted from mercantile uses to those of war transport. War risks increased insurance rates. Here we were not only cut off from Germany's great system of chemical works, but with the prices of chemicals in neutral countries increased and our means of transporting them made scarce and expensive.

We had been inclined to boast of our own natural resources, and in the habit of thinking that they would, in time of need, make us absolutely independent of all outside supplies. Now we find that natural resources, however abundant and varied, serve no useful purpose until developed. All the gold in Solomon's mines never paid a store-bill, so long as it remained in the mine. In these days, large natural resources cannot be developed or utilized until capital can be enlisted, secured by proper legislation and assurance of suitable national economic policies, and until our technical experts shall have devised suitable systems of production. These preparations take time. The war found us unprepared for its exigencies just as truly as if a hostile fleet had appeared to land an army of 500,000 foemen upon our shores.

England established her so-called blockade of German ports, and Germany put an embargo on potash export—partly to protect her own food supply, partly to embarrass crop production in enemies' countries and doubtless to cut off the supply from which potassium chlorate and related explosives might be made for the use of the enemy. Muriate of potash, worth $38. to $40., on our markets in August, 1914, by January 1915, had jumped to $60.; by March, to $114. by June, to $225; by November to $260.; and a month later, to $245; and now are announced small lot sales at $375. to $600. a ton. Our munition makers have far outbid ourselves and the fertilizer makers who work for us, and have gone out in the neutral world, as far as Java, to gather in the available small stocks of potash salts. All the other potash salts followed the muriate in disappearance from the market and in elevation of price, although their price levels did not reach that of the muriate.

Meanwhile there has been much talk about the great stocks of potash in our feldspar and other potash silicates and, here and there, somebody has gone to the expense of grinding fine some of these rocks, a process that makes them little more valuable as potash foods for plants than so much sea sand. Our geologists have bored the West for saline potash deposits, without finding anything of much economic promise. Several heavily capitalized concerns have begun to work Utah alunite deposits for both potash and alumina, without any promise of a protective tariff for potash, after the war, and without a certain market for their alumina output. The coastal waters of California bear great crops of giant kelp rich enough in potash to equal in number production our usual potash imports; but California legislation offers little protection to capital that might be gathered to utilize the marine products within California territory. So our potash production has been limited to a little dried kelp and saline kelp extract made by several small concerns, a carload or two of potash derived from alunite, and some that has been extracted by washing the flue dust of cement factories.

How about our phosphoric acid and nitrogen supplies? We have abundance of phosphate rock, but war conditions caused unsettled mine operations. Stocks are low, but prices have held at about $3.62½ a ton for South Carolina kiln-dried rock, and at $5. to $6.50 for Tennessee, 80% rock. We use most of our phosphorus in the form, however, of acid phosphate. The price per unit of 20 pounds of available phosphoric acid held firm at 47.5 cents from January to September 1915, when it began to increase. In October last, it was 77.5 cents, and in December, 82.5 cents. Now, the wholesale price of 16% rock, held firm at about $14.00 a ton, and our retail prices will probably run from $18. to $20. for goods of this grade.

This price change in acid phosphate is due not to the raw phosphate, but to the sulphuric acid. We made more sulphuric acid in 1915 than ever before, but the demands of the munition makers outran the supplies and prices went up. Our surphuric acid makers have obtained their sulphur in small part from the brimstone of Sicily, and the deep sulphur deposits of Calcasieu, Louisiana, but chiefly from pyrites. Newfoundland, Virginia and Huelva, Spain, were our considerable sources of supply, especially Spain. Furnaces adapted to pyrites can not quickly be changed to burn sulphur. Spanish pyrites found transport difficult and freight high. The prices of refined pyrites have advanced one-sixth; and of crude, nearly one-half. Hence 60 degrees sulphuric acid which was quoted last August at $.80 to $1.00 in bulk, now commands $2.00 to $2.50 and even to $4.50. America wastes from her smelters, furnaces and coke ovens vastly more sulphur than she converts into useful products. Slowly we are devising means to reduce this waste. In 1915, one-fifth of our sulphuric acid was recovered from smelter fumes. The 25% increase in production from this source has been too small to meet increased current demands. Basic slag phosphate came wholly from Europe. None is now imported.

As to nitrogen, we have depended chiefly on our own organic supplies, with additions of Chilean nitrate of soda, English sulphate of ammonia and a little American cyanamid. Most of our own nitrate imports went, before the war, into chemicals and explosives; about one-third into fertilizers. The war at first paralyzed, later stimulated the nitrate mining. Chilean prices rose. Then the Panama Canal was blocked, stocks accumulated in Chile and prices fell one-fifth, but ocean freight rose from $14. to $17. a ton, owing to the long carriage by way of the Straits. These several price factors led to the fluctuations in nitrate of soda wholesale prices in our markets. Jan.—May 1914, $2.22 cwt; June—Jan. 1915, $2.18-$1.90: Feb.—Aug., 1915, $2.05-$2.45; Sept. 1915, to date $2.50-$3.75.

The sulphate of ammonia is largely of English origin. Domestic resources are little utilized, and the domestic output is too small to determine the price situation. From a wholesale rate of $2.85-$3.00, the price has advanced to $4.00.

Our cyanamid manufacture is assuming respectable proportions, but the supplies are still to small, considerably, to affect the nitrogen situation.

Finally, as the natural result of conditions in other nitrogen staples, the demand for our organic ammoniates has risen relative to the supply, with a consequent rise in market price. High grade blood which sold, wholesale, at $2.75 a unit of ammonia in Jan. 1913; at $3.30 in Jan. 1914; fell to $2.95 in January of last year; and to $2.75 in early July; but has now risen above its old level, to $3.40. Concentrated tankage prices, have followed the dried blood variations, with price per unit differences of 15 to 20 cents for nitrogen and with a steady allowance of 10 cents a unit for bone phosphate of lime.

Our fertilizer makers have bought their stocks under these market conditions. It is stated, however, that Southern stocks have not been wholly completed, owing to the uncertainty as to the 1916 cotton acreage. If the acreage should be much decreased, present cotton stocks will suffice. If not, prices of ammoniates are expected to advance rapidly within the next few weeks.

The scarcity and high price of potash has forced difficult decisions upon the fertilizer maker. He has decided to conserve his stocks, to divide them among his customers at comparatively small advance over their original cost price, and to maintain as fully as possible his main lines of complete fertilizer. This means continued provision for crops relatively little in need of potash, but inadequately supply for those crops most in need. Still, many brands have had their potash content greatly reduced. In the Fall of 1914 official fertilizer samples, of the complete type, there was 3.33% of potash on the average; in those collected in the Fall of 1915, 1.94%. The corresponding collections of rock-and-potash fertilizers contained 3.41 and 1.87 per cent. of potash, respectively. No dissolved bone phosphate was found in the 1914 Fall collection; this Fall, 32 such brands were collected and analyzed.

The relations of selling price to commercial valuations at rates fixed in the Spring of 1915, were, for the principal classes of fertilizers sold last Fall:

	Selling price	Valuation
Complete fertilizers,	$21.79	$23.13
Rock-and-potash,	16.89	15.75
Dissolved bone,	21.52	18.32
Dissolved rock,	13.83	13.41
Ground bone,	32.79	33.56

These figures speak for themselves.

The raw materials market open to home-mixers has been much contracted. The trade in mixed goods has always supplied reluctantly the materials for home mixing, though the potash and nitrate propaganda have encouraged it. Still, ready cash always has a commanding voice, and home-mixers paid cash; while sales of ready mixed goods through middlemen, were on long credit basis. There is an agitation in trade circles for placing all fertilizer sales on a short-time credit basis, and it is urged that farmers are now so well supplied with cash that the present is an opportune time for the credit readjustment. Those behind this agitation say that, with such adjustment accomplished, the cash proffer of the home-mixer will be less attractive.

With potash scarce and fertilizer prices high, what is the farmer to do? Let him keep a clear head, in the first place. His products sell readily at a high price, and the fertilizer is a minor element of crop cost. He has heretofore bought with more thought of spending little for fertilizer, than of getting for his dollar the most he can secure of what his crops actually need. He has not been most careful of domestic fertilizer supplies, though more careful than he was a few years ago. He has been tempted to consider potash and nitrogen applications more important than the crops said they were, as compared with available phosphoric acid. He has often fed his quickly grown, intensively worked crops of high price, little more than he gave to his long-period machine-works grains and hay. In the present emergency, he may have to do without much potash, but, as Dr. Jenkins of the Connecticut Station pithily says—"he should do more *with* it." In addressing you last year, I discussed the principal methods by which the farmer may meet the potash shortage. I have little to add to what I then said, and will not take your time to rediscuss the subject.

FERTILIZER VALUATIONS

When, 27 years ago, I was first charged with the care of the official fertilizer analyses, I was required to attach to the analyses certain approximate valuations of the respective samples, and this requirement has continued. A like requirement exists in most other fertilizer controls of the Eastern and Middle states, though New York has long abandoned the practice.

Doubtless, the reason for the requirement has been the supposed simplicity of comparison it affords to the buyer, who, at the outstart and too often even yet, has little clear appreciation of the meaning of the analyses with which the valuations are associated.

It may be a surprise, therefore, when I tell you that I know of no fertilizer control officer charged with the responsibility for making the valuations, who does not regard the policy as unfortunate for the fertilizer buyer, and who would not gladly be relieved of the requirement that he make such valuations.

The reasons for this attitude are these, in part:

(1) The buyer too commonly regards the valuation to be based strictly upon the analysis. It is not sô based. It states only the cost of the same weights as appear in the goods, of fertilizer constituents bought in high-grade materials at average market prices; whereas the fertilizer may have been made of cheaper, low-grade materials.

The Chemist soon reaches the limit beyond which present methods afford no clue to the nature of the raw materials used.

(2) The buyer ought to consider his crops needs first, and then try to supply their fertilizer requirements as economically—I don't say "as cheaply"—as he can. The valuation system tends to make the buyer look to see that the selling price is not above the valuation and, if satisfied as to this, to buy without making sure that the fertilizer is what his crops want. The result is as though, having secured your wife's promise to bake you a cake upon your own promise to buy the lacking raw materials, you were to visit the store, and and finding flour worth much less a pound than sugar and butter, were to carry back to your wife only the flour, while she had neither sugar nor butter; or, if in other cases, you having bought some of each cake ingredient known to you, at an average low price, your wife were to say she already had at home plenty of sugar and butter, but that you hadn't bought enough flour. How much cake could you expect? As the fertilizer control official has considered the great degree to which the commercial valuations are mis-applied, he has reached the conclusion that a current review of fertilizer conditions without the attaching of valuations to individual analyses, would promote intelligent fertilizer buying; but that the present system of an assumed valuation acompanying each analysis, retards the development of intelligent buying. The subject is one deserving your careful consideration.

REPORT OF VETERINARIAN

By DR. C. J. MARSHALL

Mr. Chairman and Members of the State Board of Agriculture: A year ago when our meeting was convened, we were in the midst of a bad rumpus on account of foot-and-mouth disease in the State. Since that time the work has been cleaned up satisfactorily in Pennsylvania. If nothing more happens, I think it would be well for us to consider today of things that were done during the last outbreak, or might have been done, to make matters better, and I think it would be a good plan for us to review a little what has happened and see if we are not prepared to handle another situation of that kind with better results than this last one.

I did not prepare a paper on the subject; I just want to consult with you and see if you know of things that were done that should not have been done or if we could have done the work any better than we have. You may think in my making the statement to you that I have in mind, that I am inclined to brag about what happened, but that is not the purpose. I want to tell you just what happened as near as I can in the fifteen minutes allowed to me, and see if you have any suggestions to make that will improve matters.

Now, a year ago, the nineteenth of October, 1914, the acting chief of the Bureau of Animal Industry called our office on the phone and told us that foot and mouth disease had been diagnosed in the southern part of Michigan, that they had two counties in the southern part of Michigan in quarantine and two in the northern part of Minnesota and that the quarantine was sufficiently broad to cover all the danger at that time. That struck the men connected with the Board much harder than probably it would have struck you if you had heard the same message. We realized the importance of foot-and-mouth disease in this country and got busy at once. Within two hours we had a letter run off on the mimeograph and mailed to over 1,800 veterinarians in Pennsylvania and all commission men and cattle men as far as we had a list of those people. We had that letter in the mail in less than two hours, warning them of the danger of the disease, stating where it was located and telling them to be on the lookout for it and to telegraph or call us on the long distance telephone if anything suspicious developed in their territory.

Fortunately in the nineteen hundred and eight outbreak, which occurred six years before, Dr. Pearson was then State Veterinarian, and after the outbreak was over he wrote a careful description of what had happened in that outbreak, just how the work was managed, all the precautions taken, etc., and a more complete description of what happened in that outbreak I doubt if it is possible to write up. As soon as we had our letter out of the way, we began to review our literature and see what was recommended to be done and read over the regulations and symptoms of the disease and try to get ourselves ready as fast as possible, if anything did happen. We notified our agents in Pittsburgh and had a good corps of train men in the Pittsburgh office and the Lancaster office to watch carefully for any shipments from the West that came through those points for symptoms of foot-and-mouth disease, and men were put on their guard watching every shipment that came through.

Another thing we did, we sent a good man to Chicago to see if there was possibly any danger there. He went out about the 24th of October and he looked the situation over there to keep track of what was going on and see if there was any danger of infection getting into the Chicago stockyards, and reported no suspicious cases in Pennsylvania until the 29th of October; that was ten days after we got the notice, then we had a true case of foot-and-mouth disease in the Pittsburgh yards and three herds affected in Lancaster county, but none of thos animals had gone through the yards with the disease, they had gone to the farms and developed the disease there. We looked over 1,350 cattle in the Lancaster yards and did not find a symptom of disease, three days after the examination was made, but we found the disease on the farm.

That outbreak turned out to be the worst calamity we ever had in the way of contagious diseases among animals in America, and I brought you this outline to show you something about the statistics of the disease in the country. I presume you are familiar with it, but I just want to call your attention to the way the thing was distributed. This gives you the number of states in which the disease occurred, the number of counties in each state and the number infected. You will notice that in Illinois they had 102 counties in the state, of which 52 were infected; number of herds infected, 768; number of premises infected, 709; in Pennsylvania we have 67 counties, of which 34 were infected; number of herds infected, 858; number of premises infected, 795. I will not read over the whole chart, but Illinois was one of the worst infected states in the Union. More than half the animals that were killed were in the State of Illinois. The number of cattle slaughtered was 24,338; number of swine slaughtered, 33,434; number of sheep slaughtered, 1,248; number of goats slaughtered, 22; total number of animals slaughtered, 59,024, in Illinois on account of this disease.

The first infection they found on November 1, two days after we found it in the Pittsburgh yards, and the last case they had till this report was made was April 23, but since that they had a second outbreak and that has added a good many animals to the total reported here.

It is estimated that it cost the State of Illinois $200,000 to clean up this second outbreak, and just last Saturday they had another little outbreak in the central part of the State. They found the disease on one farm there; a suspicious lot of hogs were received in the National stockyards at East St. Louis, Illinois; the Federal Government sent men back to that section to look over the animals in that community and see if the disease existed there; they were not quite sure on this shipment that came into East St. Louis, but they sent their men back to the neighborhood from which the hogs came and they located one definite herd there that was positively infected with the disease, and 16 head of cattle and 24 hogs in that herd. They had one other farm in the neighborhood that was suspicious. The Government immediately quarantined that county, and they do not know from what source that infection came. That is a disagreeable feature of the thing; if we knew where the infection came from, we would be more contented about it, but previous to that, the last disease they had in Illinois was the 25th of December, in Lake county, Illinois. That was not very far from the Durand herd where there was so much excitement before they could destroy it.

The second outbreak has cost the State of Illinois, or will cost them, $200,000 to clean up, and it came from infected hog cholera serum made the last of October, and from some hogs that came from the southern part of Michigan, and it was not known at the time that they had the disease, but it was found later that that serum contained the disease and started up a new outbreak in eight different counties in Illinois and one county in Minnesota, and one outbreak in two other states. But we did not feel so uneasy about that one as this one at present, because we know where the infection came from, and in the case of this one we do not.

You might want to know what Pennsylvania is still doing to keep her herds free from the disease. The first infection we had in Pennsylvania was November 1, as the Government has it reported here, but it was the 29th of October. Our last case was the 29th of April. So far as we know, we have not had a case of foot and mouth disease in Pennsylvania since the 29th of last April.

Now we have been watching Illinois with a great deal af interest, and the situation there at the present time is this; we are not accepting shipments from Chicago or East St. Louis for any purpose except immediate slaughter, and then they must go into slaughter houses that have Federal inspection or some kind of inspection, or the owner of the slaughter house must give us a sworn statement that he will kill all the animals he receives inside of forty-eight hours. We allow them to unload animals for feed, rest and water at stockyards if they are willing to handle animals of that kind by themselves and will not let animals used for dairy purposes go through those places afterward. There is only one stockyard that is willing to handle those animals in that way and they have a permit for unloading them for food, rest and water in the Connellsville stockyards, but the Pittsburgh, Erie and Lancaster stockyards have decided that they won't bother with those interstate shipments. We have had this same kind of regulation in Chicago all the while up to the present time, but today we have added in the same category shipments from East St. Louis. I think we are perfectly safe; I do not believe there is any danger of the disease springing up in Pennsylvania again unless we bring it in. I think the time has already passed when we need not feel any uneasiness from infection lurking around in the State, but there is danger, if we are not very careful, of getting the disease from Illinois.

Now, I want to say something about what our Legislature did, and what the Board did, etc. In Illinois they have not yet paid the farmers the indemnity for the cattle destroyed, and that amounted to $1,600,000, and this last outbreak will add $200,000 to that. Governor Dunne called the Legislature together in special session to appropriate money to settle these claims of the farmers and the farmers are all on the job trying to do their part; the members of the Legislature representing the agricultural districts are on the job trying to get the necessary appropriations to settle up these claims, but for some reason they do not get a quorum. Men not directly interested in agriculture are not attending the meetings and the farmers are pretty badly discouraged out there for the reason that they haven't gotten their money. Just last week the Congressman-at-large from Illinois introduced a bill in Washington to see if the Federal Government would not put up $1,800,000 to pay the indemnity for the State of Illinois. The Federal Government had paid its half, but Illinois wants the Federal Government to pay Illinois' share of it. I don't know where they will come out on that kind of proposition, but all the other states paid their bills and I expect Illinois will do it too, but it is a pretty big burden.

In our State it cost $625,000 to pay for our troubles, and so far as I know, all just claims have been paid. You have heard probably that in the 1908 outbreak some of the farmers did not get paid for their stock. As far as we know there is not a claim filed that has not been paid unless there is some hitch about the payment of that claim, and it is interesting to contrast the way Pennsylvania does business with the way they do it in some other states. When our Legislature was called to order in Harrisburg in 1915, about the first thing done was to put a bill in their for money to pay the indemnity for the cattle destroyed up to that time, and that appropriation was granted in full and the Governor signed it as quick as he could get hold of it. There was not a word against it in either the House or the Senate. They put the money up as generously as for any purpose you can imagine, and then later we had to ask for $125,000 more, the first amount was not enough, and that came just as cheerfully, and I don't know how you could ask our Governor or Legislature to have done any better than they did with the appropriation part of it. A good many members of the Legislature felt that it was not right that our law should limit us in the extent of appraisement that we should make on animals that were ordered to be killed for the good of the public. Under the old law we were limited to $40, on non-registered animals and $70. on registered cattle, and our law will not allow us to pay more than $10. for a sheep or more than $10. for a hog, and you know very well that is a pretty small payment for some of our good hogs, and the sheep men and hog men looked upon it as a joke. The Legislature felt that that limit on animals should be removed in a case like that of foot and mouth disease and that if the State is going to kill them by force or make the farmers kill their animals for the protection of the public that they should pay full value for them, and that bill was introduced and went through without a word against it and was signed promptly by the Governor, so if we have trouble in the future with foot and mouth disease—and I hope we wont—if we come to appraising animals, they will be appraised at their full value and the State will pay whatever it agrees to pay. The State did not set aside a certain sum of money to pay indemnities; if we get into new trouble—fortunately the last outbreak occurred just as the Legislature convened and we could get our money promptly, but if that had occurred a year later, the farmers would have had to wait a year until the Legislature convened and that would have put the farmers in very bad financial condition. Some states have set aside a certain sum of money to meet these emergencies; Pennsylvania did not do so, but I feel that we will have very little trouble in the future in convincing our people that if the state makes a promise that it will try to pay for calamities of that kind, it will make good, because it has settled fully for two out-breaks now and I think people generally have a good bit of confidence in what the State will do.

I don't know that there is anything more to say about foot-an-mouth disease just at present. There are a great many things that could be said about it; there are some other diseases that you are probably as much interested in now as foot and mouth disease—something in reference to tuberculosis. It was necessary for us to use up so much of our money on foot-and-mouth disease, $625,000— that we had to change our plan a little in handling tuberculosis. Up to last July, we always arranged to pay some indemnity for cattle that were condemned for tuberculosis. They were appraised under the same plan as we appraise in foot-and-mouth disease, and we could pay $40. for a non-registered animal or $70. for a registered animal, and we could pay them that indemnity, but on account of the money we used up for foot- and- mouth disease and our not being able to get any more from the Legislature, we had to cut out the indemnity for cattle out of this appropriation. Some of you may think that is an injustice and I am rather surprised myself to find that so many of our farmers are keeping on with the tuberculin test although they get nothing for the animal destroyed except what they get after slaughtering from the butcher, for the offal, hide, etc.

In reference to contagious abortion—that is not a reportable disease; the Board is not compelled by law to handle contagious abortion, but from the letters received from our people in the State, there is no disease that the breeders are so much interested in as they are in abortion. Now we have been trying to do a little work in it, but I do not blame you if you think it has amounted to nothing; in fact we have a pretty hard proposition there in knowing what to recommend in reference to abortion and sterility in dairy cattle, and we do not have very much trouble with that subject in other species of animals, but in nearly every mail we have a few letters from somebody who wants to know what is to be done for abortion and sterility, and we have been recommending them to isolate their animals and use local douches, etc. of antiseptics, and I do not know whether much has been accomplished in that line or not. I doubt if it pays a man to bother with it. As far as I can see at present, I think there is hope of doing something in pure bred herds, where they want to raise calves, especially. I believe that there is something that can be done, but it is nothing that you can do yourselves yet and I doubt if it will be anything you can do for a good while in the future. I do know of men that can do something for that kind of condition, and at the present time the Board is trying to make an effort to have some men trained to go out on cases of that kind and do something for the herd owners at the expense of the state, to demonstrate that it is possible to accomplish something. At the present time a herd owner does not feel justified in paying for services when he don't believe there is going to be any results obtained from it, and I do not recommend you to do it until we can demonstrate to you that it can be done properly. I will be glad then if you will be interested in it, but as far as native herds are concerned, I doubt if it is worth bothering with; take your chances and put up with it as you have done in the past.

Hog cholera has not been so bad as in other years. I think the restrictions we had on the foot-and -mouth disease, disinfecting cars, cleaning up the shipping station and preventing shipments, to some extent, from other states, had a very good influence on hog cholera. We are still using the serum treatment and the quarantine in handling the disease, and where the disease is reported promptly, I think we have very good results. I think in any herd of hogs if the owner watches the herd carefully and reports the disease promptly and has it attended to with vaccination, I think there is very little excuse for a man losing very much from hog cholera. The trouble comes by not recognizing the disease soon enough and by delaying the treatment too long. There will be some losses the best you can manage, but if you are prompt in reporting the disease, if you treat it promptly, your losses will not be very heavy. I don't know that there is anything else unless you want to ask some questions about the work. I feel that it is the purpose of all the departments of the State to take citizens into their confidence more in reference to doing work in the future. We do the work the best we can, we do not pretend to know it all, we are ready for suggestions at any time, and if any of you know how work can be done better and how better results can be obtained, we are glad to receive suggestions at any time, either by letter or in meetings of this kind, and if any of you have any questions to ask, I will be glad to answer them if I can. If not, I wish to thank you for your attention.

REPORT OF COMMITTEE ON DAIRY AND DAIRY PRODUCTS

By B. F. WAMBOLD, *Sellersville*

American livestock producers rarely, if ever, encountered more adversities in one single year than they experienced in the year 1915 just past. In the face of all misfortunes, including foot and mouth disease, together with the unsettled conditions of commerce resulting from the European war, still there have been evidences of the betterment of the dairyman's condition. The Cow Testing Association, co-operative buying and marketing, especially was the improvement noticed in the co-opérative creamery interests which furnished the dairyman the full value of his product.

The Cow Testing Association has opened the eyes of many a dairyman and gave him a firmer foundation. When one is approached and asked to identify with himself the organization, seemingly realizing his financial ability to unite, he is very apt to suggest the name or names of his more prosperous neighbor or neighbors, whose interest might be enlisted. The Association is designed to furnish information which is worth gold to the dairyman. The poorer his herd and weaker his finances the more eager should he be to ascertain the leakage in his business and seek the information to aid him in determining which one cow or more should become the basis of his future and more profitable dairy. Many a dairyman has told me that his cow produced a bucket of milk a day—never once making mention of the size, whether an 8, 10 or 12 quart bucket. Accuracy in figures alone makes the calculation worthy of note or notice. If he could definitely state that his cow produces 30, 40 or 50 lbs. daily, how much more satisfactory? And, if at the end of the year he could supply a complete record of production of 3,000 or 8,000 lbs. with a 3½ or 4% test, what an advantage and satisfaction indeed.

This can be readily done and with a small outlay. A milk scale, a sheet-paper and a Babcock tester together with a few spare moments of his time would be the equipment. He will, however, tell you that he has no time but he could well afford to take the time if he would eliminate the unprofitable and thus become the gainer financially. True, indeed, it is that many obstacles confront the dairyman which may more readily be overcome in other lines of business.

The luring wages and comforts of the city and at this time the munition plants entice away the farmer's boy from the farm to take a hand in the manufacture of shot and shell to kill the soldier of other countries while the poor babies in foreign lands are crying aloud for milk to satisfy their hungry stomachs and the farmers' sons in our country are maimed or possibly killed in the twinkling of an eye. All this has a tendency to decrease production, for there is no line of employment which calls for more competent and efficient labor.

The dairyman must ever be wide awake and on his guard for 365 days in the year if he would succeed. The *Cow* is at times termed a *Machine,* which name, in my humble judgment and estimation, is false and wrong, giving an entirely erroneous conception of the animal which I personally hold in higher esteem and regard.

No other animal is more ready and willing to respond to kindly treatment than the *Cow* and will show returns for same in dollars and cents in her product. Have you ever, as a dairyman, tried to remove the dust from her back with the milkstool in angry passion before milking? If so, use the scale afterwards and this first operation will convince you that it was a costly one. On the other hand use the curry comb and brush and then the scale to note the profit accruing from this operation. Remember that the cow has life and her sensitive nerves readily contract and relax which is not the case with the nerveless machine.

If the cow throughout her lifetime from birth to the gambol were treated according to her real needs and wants, we certainly would have more profitable dairies and better diarymen, better farmers and farms, and larger crops too. Here is the secret to meet the appealing argument of the fertilizer agent when you can produce as evidence her profitable by-product—the indispensable *manure.* I might at length refer to other important matters in the dairy and to the dairyman, viz, sanitation, equipment and disposal of the dairy product. These are very frequently neglected or overlooked by the dairyman as well as the State and all this tends to decrease the consumption of the dairy product.

"The High Cost of Living" is the cry to-day. Place the dairy product side by side with other necessaries of life—tabulate and note results. The public press and medical fraternity have laid the cause at the feet of the cow and her products in case of epidemics. In my home town an epidemic of typhoid broke out last year, and 'milk infection' was the immediate outcry, but no one made mention of the filthy alleys containing garbage which is ever the sweet prey of the dangerous *Fly.* The sewage disposal plant, often discharging its filth into the near-by stream, went unnoticed. The State should see to proper inspection and resort to rigid measures to compel the dairymen to produce a clean article, for he must often compete with the one who does not always live up to the requirements of the law.

I made an effort to secure statistics from both the State and Federal Departments for the year just closed, but was unable to gather any, hence the Committee is obliged to report without the usual statistics, ordinarily so valuable.

Let us hope, by way of conclusion, that the Committee did not fail to impress upon this body the great importance of the dairy industry and its products so as to build up our soil condition and the health of the nation, realizing fully that the dairy product furnishes the nourishment of mankind from the cradle to the grave.

The CHAIRMAN: Is there any discussion on this report?

MR. DeWITT: Tioga county has more creameries and more money invested in creameries, I think, than any other county in the State. What I may say I do not wish people to think is a thing that particularly belongs to Tioga county; but I wish to say it to warn you fellows who have some little private institutions of your own and some creameries, some skim milk stations and some cheese factories of your own, not to be too free to give them up to large corporations who will seek to destroy your little plants and build up a plant of their own and then you are at their mercy. Such is the situation that confronts the dairymen of our county today. Gentlemen, there was a time when we had, all over that county, small institutions like that I have been telling you about. We had small creameries run by the farmers who had consolidated themselves, a few of them, to make their own butter; cheese factories which had consolidated in the same way—a few of the farmers had come together and built some cheese factories and made their own cheese. Just recently there was dissatisfaction, and not only recently, but this thing has been going on for sometime. About 15 years ago some corporations crept in there and set up a skimming station, a butter factory, a powdered milk factory, two or three milk condenseries, and some of the patrons of those are not just satisfied with the treatment they have been receiving. They held a meeting just the other day in one of the localities where I live, and in fact the milk from any farm goes to one of these corporations, and they wished to have a talk, as the farmers, I think, were entitled to have a talk with those people who were running this factory or condensery. They did not appear upon the scene, but told them "If you are not satisfied with our usages go somewhere else."

It reminds me of the fellow that died. He went to the good place and he looked the books over and did not find himself recorded there; finally he went down to the other place and they didn't find his name recorded there and told him to go. He asked, "Where will I go?" They said, "I don't care where you go, you ought to go back where you came from." Now here is what I wish to tell you men who are interested in the dairy business, that they had our little creamery, they had our little skimming station and they had our cheese factory all destroyed; we have nothing; we are just simply at their mercy, and now the question that arises is to get those men together again and try to get them together so that we can get our milk into another channel of being manufactured.

I say this to you fellows who are dairymen. Some of you care nothing about it because you are not dairymen, but I want to say to you right now that those fellows in the western end of the State and in the western end of Tioga county feel very much hurt and one of the biggest condenseries in the world is that doing business at the county seat or near Wellsboro, and the other day the proprietors of the institution made the price to them for the year with a 5% reduction. There is nothing that you know of or I know of to warrant that reduction at this particular time, but their little factories were all gone and they simply had them at their mercy.

One young man told me the other day—to show you furthermore how sometimes these things are run—that he patronized the station, this factory, and he has been at the State College and understands the testing of milk as well as their man who does the testing for them. He took his milk to the factory and when they took out the sample for a test, he had them to take out a sample for him to test, also; there could absolutely be no mistake, and when the test was given him by the factory and he compared his test with it, they differed some 6 points. He went back to them and told them "I know that I am absolutely right; I am perfectly willing that you should take a sample of the milk, if you are not satisfied, and send it to the State College or any other place, and I am perfectly willing to abide by the decision of anybody who is competent to make this test." They simply said "If you are not satisfied with our test, go somewhere else; we are doing business here; neither the State College nor anybody else is doing it for us." Now, gentlemen, what I have said, I have said particularly for you people who may be thinking of giving all you have got in the dairy line into the hands of some other person to control; don't you do it.

ADDRESS OF DR. SPARKS

I can only say that I am sure everyone interested in agriculture is interested in getting the most out of the State's money which is appropriated for the various lines of agriculture. I know that you are all interested in the present interest which is taken by the Governor of the Commonwealth and the Secretary of Agriculture and those who are charged with the administration of the School of Agriculture at Pennsylvania State College, to so harmonize these factors of the State Government that the money which is expended shall bring the largest returns. No one of us would voluntarily keep two teams to do the work on the farm which one team could do, and we all realize the necessity of making a proper adjustment between the work to be carried on by the School of Agriculture at the College and the work to be carried on by the Department of Agriculture at Harrisburg. That is the task the Governor and Secretary have set themselves to do, to divide the line, as I understand it, by an arbitrary division which shall say that such work as you have had more this morning, with Dr. Marshall this afternoon, and others for proper protection for the people, the protection of stock and the protection of the materials you buy from adulteration—all that is the great work which the Department of Agriculture has to do, and that the work of instruction, of ascertaining information through the experiment station, of carrying that information to the people, better methods, more economical ways of doing things on the farm—that that belongs to the College; and they are trying to differentiate and divide the work in precisely that way, so that the people will get the largest return for the expenditure of their money. That is the thing we are all interested in, and that is the great work we are trying to do at the present time, and I know that no one more highly appreciates this and is more deeply interested than the State Board of Agriculture itself. And I want to say that we are trying, at the College, to carry on the work for the best interests of the people, trying to ascertain the facts through our various extension agencies made possible by this Smith-Lever Bill, we are able to carry that out in a way to give increased production and with increased production comes increased prosperity and with increased prosperity comes happiness for the people of the State. Thank you. (Applause).

REPORT OF COMMITTEE ON COMMERCIAL FERTILIZERS.

By F. S. BRONG, *Chairman*

There is not another single item of expense for which the Pennsylvania farmer spends so much hard cash as for commercial fertilizer. This report is in the interest of that farmer. Let it be remembered that we are not talking about regular truck farmers or other highly specialized producers, though we believe in a general way these recommendations will also apply to them.

The first commercial fertilizer of which I have any recollection was crushed bone or bone meal, which was closely followed by acid phosphate and then by one after another of all the various combinations that high salaried officers in fertilizer factories could create. If we can take their word for it there are now nearly two thousand brands, each one better than the other, from which the farmer can take his choice.

Commercial fertilizers are designed to supply any one, or two, or all three of the plant food constituents generally conceded to be likely to be lacking in available form in ordinary soils, viz: nitrogen, phosphorus and potash. The nitrogen for the fertilizer may be derived either from a mineral, a vegetable or animal product. It may be in a form of immediate availability for plant use, or it may be slowly available, or it may be in such condition that scarcely five per cent. of it can be used by the plants in any one season. Again certain products carrying nitrogen are alkaline in their nature while others are neutral, and still others decidedly acid. In a somewhat less degree the same may be said of the materials from which phosphorus and potash are derived.

I believe that up to date we have missed the mark in our legislation for fertilizer control. We have taken it for granted that the matter of availability was all the farmer needed to know in regard to the fertilizer he spent his money for. Whether it was of mineral, animal or vegetable origin, whether it was acid, alkaline, or neutral in its chemical effect on the soil, these are thngs we have taken for granted the farmer need not know. Whatever we may have thought, or whatever fertilizer representatives may have been able to persuade legislatures to believe, the fact remains that these things are vital to the farmer.

Everything the farmer sells is regulated by law. When he sells a bushel of potatoes or apples he is required to give sixty or forty-five pounds, respectively, although it is scarcely possible ordinarily to heap this weight on a bushel measure. If he sells dairy products a close inquiry is made as to what he fed his cows, and as to the cut of dress of the person who does the milking. If he sells wheat he may not deliver rye to the purchaser. But when it comes to purchasing that which may mean success or failure for his year's work the legislature turns the farmer over to the tender mercies of the fertilizer companies.

During the year 1915, fully 33,000 tons of fertilizers, in bags, were sold to the farmers of the State at a cost to them of $8,500,000, not more than $4,000,000 representing cost of material. The other $4,500,000 being composed in salaries to the officers of fertilizer companies, dividends, salesmen's commissions, mixing and bagging goods, office expenses, etc. The source of European potash having been almost entirely cut off from the result of preparedness on the other side of the pond, has resulted in one year in increasing the use of acid phosphate about 250 per cent. and raising the price of this American staple about 50 per cent.

About ten or twelve years ago before a local farmers' institute, the writer of this report made the statement that the ordinary grain farmer could not afford to depend on the nitrogen in commercial fertilizer to grow his crops. At the present prices of acidulated phosphorus and water soluble potash, I now unhesitatingly put these two elements in the same class. In other words, under present conditions the ordinary farmer cannot afford to use the product of the fertilizer trust.

To this general rule I would note a single exception. To increase production without the direct use of commercial fertilizers on a farm accustomed to their use is not an easy task. On ninety-nine out of every one hundred acres in Pennsylvania the first thing, and often the only one that is needed to bring up the crop producing ability is humus. To get the organic material out of which we make humus grow a succession of leguminous crops and work the full crops into the soil. To increase this growth it may be profitable under most conditions to apply some water soluble fertilizers.

When the soil is being filled with the various growths of legumes it is also being supplied with nitrogen. Nitrogen is the form that nature provided for plant growth from the beginning. In the breaking down of the organic structure of the plants in the soil the almost exhaustless store of potash is touched for all present needs. On many soils we believe the use of floats or finely ground Tennessee Phosphate Rock direct from the mine to the farm will pay in connection with the above treatment.

Availability. What sins have been committed in thy name! Instead of assisting nature to grow our crops in nature's way, we have depended on the factory made nostrums to feed our crops. The result is that we have so depleted the organic matter in our soils that if it does not rain for eight or ten days during the growing season we become panic stricken. With a little available plant food we have stimulated the soil to over exertion and the succeeding crops show the reaction. Availibility. To get it, fertilizer concerns will gather up any old thing with an acid to break down the organic structure, and then use it in complete fertilizers. In nature, the breaking down of the organic structure of plants or animal products in the soil results in bacterial action and is of very great importance in its relation to plant growth. Even bone meal, animal tankage, and ground fish are now often aciduated to make them available. The fertilizer concerns do it for a price; but the farmer who uses these products should have his sanity inquired into.

It is my firm conviction that it is just as great an offence against morality to swindle a farmer as it is to goldbrick a mason. It is not my desire to ask special legislation for the farmers' uplift. He would resent that. All he looks for is simple, old fashioned justice. The fertilizer companies boast that they can and do use materials in their fertilizer against the laws of the State. I would have the legislature rewrite those laws. In addition to the present requirement of the per cent. of available nitrogen, phosphoric acid and potash printed on the bag, there should also appear the name of the material or materials from which the different elements have been derived. In the case of organic material the law should require the statement as to whether the organic structure remains or has been broken down by the use of acids or other chemical action. The condition of the contents of the bag as to acidity could be indicated by one of three words; Neutral, Acid or Alkaline.

If proper penalties are provided,—and it is absolutely essential that there should be,—for those who would defy the law, these requirements could be easily enforced by the Department. Then would the farmer know what he was putting into his soil and Pennsylvania agriculture would take a long step in advance.

REPORT OF COMMITTEE ON WOOL AND TEXTILE FIBRES

By MR. S. C. GEORGE, *Chairman*

Mr. Chairman and Members of the State Board of Agriculture: In attempting to report on this subject, I feel it is too difficult for one of my ability or experience to cope with; but never wishing to shirk a task when it is imposed upon me, I shall make the endeavor, feeling that he who makes the effort is the one who is rewarded, rather than they who hear it read.

While the subject is Wool and Textile Fibres, yet it must be treated in a more general way: The animal, its value for food, its offspring, its habits, danger from enemies as well as for its fleece.

THE ANIMAL

The sheep must first be considered. Does anything on the farm appeal so much to the farmer and his boys as a flock of fine sheep? The innocence of the young lamb, the gentleness of the grown sheep, the almost human instinct of the mother when caring for her young, and even the more vigorous efforts of the male to protect the flock from enemies. Even his attack upon the shepherd during an unwary moment, and arousing his ire for the time is soon forgotten in the large fleece he will yield at shearing, or the sturdy lambs that will be seen skipping on the hillside in the gentle springtime.

Where sheep originated is a question difficult to answer. They are the first of the animals domesticated by man, and reasonably so, since they supply the two principal wants of the barbarian, food and clothing. They are found in every country, not entirely savage, from the Artic to the Torrid Zones.

There are many distinct varieties of sheep; some valuable for their wool, some for their flesh, and others are dual purpose, producing a good fleece and still have a fine carcass. The selection of a flock will therefore depend upon the purpose for which they are kept. If the production of wool is the principal aim, then individuals of the wool breeds should be secured. But the flesh of the sheep has become so well known as an article of food that it ranks high today as one of the best of meats on the market; not only in quality but in price. Some years ago it was contended by certain consumers that the flesh tasted from the wool, but the skillful butcher can satisfy anyone that this is a fallacy. Hence when the flesh is good for food and the wool for garments and cloth, one of the medium wool breeds should be selected.

Among the more prominent breeds are the Leicesters, Cotswolds, Southdowns, the Lincolns, Oxfords, Shropshires and Merinos. The Lincoln sheep were first imported into the United States in 1835. The Cotswold in 1832. The breeding of the Merinos was begun by Mr. Atwood in 1813. In any case, whatever may be the breed, it is important that strong, vigorous animals be secured. Sheep, like other animals, should have good size.

In starting a flock of sheep the inexperienced man should begin with a small number, probably twelve or fifteen ewes. We have found on our farm that the Merino ewe was a very profitable one to keep. A little harder to winter, not being quite so hardy as some of the other breeds but not so hard to summer not requiring so much range, not so likely to jump and not so liable to disease, and when bred to a ram of some of the open wooled breeds, the lambs were large and good sellers, never failing to make a good profit. Quoting from the Secretary of the Delaine Merinos Association: "The importance of a better fleece is the leading question of today among breeders who are trying to produce better Merinos. Wool of a higher grade, a quality from which the higher class of fabrics can be made. Evenness of fleece and fineness of fibre are two things to be considered." He says further, that the Tasmanian fleece grown on an island near Australia is our strongest competitor.

Not only is the fibre to be considered but the oil and difference in shrinking from scouring. The preparation of wool is very important. Several years ago, all sheep were driven to the creek, or a dam made in the meadow brook on the farm, and were washed before being sheared. When the owner did this himself he could have reasonably clean wood, but when some one else had to be employed to do the work it was not so well done. Then when time was given for the wool to dry on the sheep before being shorn, it accumulated a good deal of dirt. Some was tub washed; that is, after being shorn, was washed by hand and dried in the sun, and some was shorn and sold without being washed. In this way there were too many grades and too many prices, the washed wool not being of the same quality. Now no one washes his sheep nor his wool, but all is shorn and sold as it comes from the sheep.

It is a good plan with breeding ewes to tag them; that is to clip away the locks from the hind legs and udder, before lambing time. This relieves danger of the accumulation of filth and the breeding of worms that often results from the neglect of this. This wool should be kept by itself and sold as such.

PROFIT IN SHEEP

That sheep are one of the best money makers on the farm cannot be denied. Our own experience has proven to us that with a flock of sheep, after counting off one-half for feed and care, as the share man usually gets, has yielded a profit of 33⅓% on our worst year, on the money invested, while better years have given us 70%. I wish to quote from a clipping in our own county paper. The gentleman named is my own neighbor of about three miles distant: "D. W. Anderson, of Parkwood, a progressive farmer, has demonstrated to his own satisfaction, that there is money in sheep in this country. He brought 55 lambs to Indiana on Thursday. They weighed 5,200 lbs. or nearly 95 pounds each and brought $7.00 per head. Half of the number were twin lambs. Counting the wool secured from the ewes which raised the lambs, each ewe has brought about $10.00 this summer. The entire flock has made Mr. Anderson more than a dollar a day for the past four years."

The price of wool is stronger at the present time.

Great Britain has proclaimed further, though not definite limits on the exportation of wools from her colonies. Foreign markets are stronger than in the recent past, while prices are higher than a year ago in Australia, Africa and South America. The advance amounting to 50 to 75 per cent. on most grades. Even if prices were not higher on other continents the advance on ocean rates would add to the cost of wools here. Ocean transportation is at a premium these days, and there is no commerce commission to prevent vessel owners from charging all they can get. As a natural result of these conditions and the big orders now in hands of the mills our wool market has shown strength in recent weeks, and if the present war continues the chances are in favor of the producer.

SOME DIFFICULTIES

The old adage that a change of pasture is good for sheep is not only true but it is essential. Sheep are great scavengers, they clean up many of the weeds on the farm and along the fence rows. Many claim that they will live on these and require very little attention; but it is evident that the sheep, like other animals, respond to good care and treatment, and the better they are cared for the more profitable they are. A change of pasture is more essential than a very large range. Therefore it is better to have the pasture divided into fields and change the flock from one to another every week or ten days than to allow them to roam over the whole pasture at will. And here comes in the fence problem. Fencing material is so scarce on the average farm, and timber so high in price that the farmer can hardly afford to use it, and the material we buy is scarcely worth putting up. Here, again the war looms up. Galvanizing material is so expensive and difficult to get that much inferior wire is on the market. Sheep require a closer fence than most other stock. Hence this is one of the problems that is hard of solution. Other animals may be kept in close quarters but not so with the sheep.

ENEMIES

The worst enemy the sheep man has has to contend with, especially the one who lives near a mining district, is the much discussed or cussed dog. According to statistics, compiled by L. H. Wible, Statistican of the Department of Agriculture, the sheep killed by dogs in 1913 were 6,393 and the number injured were 4,845. The average price paid for sheep killed was $6.35 and for injured $2.85 or a total of $54,322.70. Now how many dogs would it take to be worth that much money? We think there is not one dog in a thousand that is worth the price of the lead it would take to put him out of existence.

The number of dogs killed were 1,419 and this cost the State $1,719.56. The amount expended for the payment of horses bitten by mad dogs was $2,593.37 while the amount expended for dog tags was $2,813.31.

We find further that the number of sheep in Pennsylvania declined from 1,531,066 in 1900 to 883,072 in 1910, a decline of 43%. From one of the leading sheep states of the east, we have fallen away until the last census reports that only 11.6% of our farmers report sheep among their livestock.

Other causes may enter into this, such as tariff tinkering, and diseases of sheep, also the fence problem of which I have already spoken, but the dog is the principal cause.

In Washington county, the great sheep growing county of the State, last year the funds for paying sheep claims were exhausted, and the claims were three years in advance of payment. It was further reported that the number of dogs in that county was one to every three taxables, while some of the towns or villages did not report so many, it was believed that the assessors were negligent. A friend in Cambria county informs me that when a farmer undertook to rid his farm of dogs that the dog owners burned his barn to the ground.

REPORT OF SANITARIAN

By DR. SAMUEL G. DIXON

Two years ago I called your attention to Doctor Van Slyke's valuation of the loss to farmers of the United States through the waste of liquid manure; his estimate of this loss being seven hundred millions of dollars annually. I also tried to explain to you the activities of the Department of Health in purifying the waters of the State and the results which were being obtained in the saving of life, suffering and sorrow. During the two years which have elapsed since last I had the pleasure of speaking with you, this work has been continued and the death rate from water borne diseases further decreased. During these two years our stream inspectors have been out upon the watersheds making their inspections and securing the abatement of stream pollutions, among which liquid manure from barnyards plays an important part, and it is particularly along the line of conservation of our natural fertilizers that I wish to make my report to you today.

We believe that the farmers of the State are beginning to understand that when they are ordered to conserve the liquids in their barnyards and not permit them to be washed into an adjacent stream, they are not being persecuted or having hardships imposed upon them in order to save others but that not only the inhabitants of the cities and towns down stream are protected by this work but that they themselves are benefitted as well.

During the last two years over two thousand four hundred barnyard pollutions have been discovered by our inspectors and abated by the farmer. Many of these abatements are made at a very slight cost—in some instances by throwing up an embankment of earth around the yard and turning the surface drainage of the adjacent ground in another direction; in other instances by putting a down spout on the barn roof and carrying the roof drainage outside the barnyard, and in extreme instances by the construction of a concrete retaining wall. Just lately a farmer in Porter township, Clinton county, built a concrete wall around his barnyard—120 feet in length, 10 inches thick and 3 feet high in compliance with an order of abatement. When our inspector went to make his re-inspection after the wall had been built the farmer told him he would not have it away again for five times what it cost.

Pennsylvania is saving ome of the seven hundred millions of waste in the United States found by Doctor Van Slyke. Prof. Snyder in his excellent book on "Soils and Fertilizers," published in 1911, tells us that a milk cow when fed a balanced ration will make from sixty to seventy pounds of manure per day of which from twenty to thirty pounds are liquid, and that when a cow is fed clover, hay, corn fodder and grain, about one-half of the nitrogen of her food is in the urine; one-fourth in the milk and the remainder in the solid excreta, hence if the solid only is collected only one-fourth of the nitrogen of the food is recovered, while if both solid and liquid are utilized, three-fourths of the nitrogen is secured. The ordinary horse produces about fifty pounds of manure per day which while by itself of questionable value, is well known to be valuable when mixed with cow manure.

An average farm with six cows and four horses will produce in the barnyard probably fifty tons of manure per annum which, in comparison with commercial fertilizer, has a cash value of about $250. The nitrogen in commercial fertilizer represents about ⅓ of its value, therefore, the nitrogen in the natural fertilizer would be worth approximately $80 per year on the average farm. Two-thirds of this nitrogen is in the liquid manure and if this is wasted the farmer is losing at least $50 each year, but during the last two years on 2,400 farms in the State this valuable product which two years ago was permitted to drain into the streams is being saved, representing a total saving of at least $120,000 a year to the farmers of the State. The total cost of making the necessary improvements on these premises probably did not exceed $20,000, and the saving to the farmers of the State in one year exceeded the total cost both to the farmer and to the State in not only conserving wasted fertilizer but in protecting streams from pollution and our people from water borne diseases. The older civilizations of Europe, and even China, in their intensive farming long ago learned the value of liquid manure, and perhaps for this reason alone and without any idea of protecting the purity of their streams or the health of their people have carefully retained this natural fertilizer and not permitted it to be wasted.

Just now all this means a greater saving to the farmer than ever before in the history of this country on account of the extremely high price of artificial fertilizer. It is very gratifying to me to be able to report that the farmers are beginning to realize the value as a fertilizer of this liquid which heretofore has been treated as a waste. I have often been asked why some of my hillside crops are irregularly streaked with dark green—it is because I have a primitive method of spraying manure water with a hogshead and a hose which does not spray the water uniformly, therefore, the vigorous stalks of wheat that have received more than their usual measure of food show this dark green color.

This is a day on conservation of our natural growth. As we look over our naked mountains we regret the waste of our timber lands. Men are spending much time and thought upon devices to utilize the waste thrown out in former years from our coal mines, and so the farmer must realize as well that in the past he has not been getting the full value from his soil. Our farm lands must produce more if our ever increasing population is to be fed and if the soil is to feed us to must in turn be few. We must no longer waste our most valuable fertilizer. I regret to report that many of us are continuing to allow our most valuable fertilizer to be washed away. There are one thousand barnyards which have come under our notice that have not yet been improved. We hope that by another year this number may at least be greatly diminished.

REPORT OF THE MICROSCOPIST AND HYGIENIST

By PROF. J. W. KELLOGG.

The subject matter of the report of your Hygienist and Microscopist should be, so far as possible, in keeping with the title; and as the outward appearance of our dwellings and other buildings, which should ever be pleasing to the eye, is in the nature of "hygiene for buildings," it seems fitting at this meeting of the Board to report what has thus far been accomplished in the way of properly caring for and prolonging the life of our buildings. As our bodies are in danger of destruction from disease, if not properly cared for and protected, so are the structures in which we live, house our stock and store our goods subject to a like destruction by the continual tearing down processes of nature,—if they are not kept in repair and protected by a combination of materials which we call Paint. We are all familiar with the splendid appearance of those farm buildings which are kept in repair and painted from time to time as required, as compared with those structures which are neglected in this respect and which have fallen into ruin and decay. Some buildings which are not cared for soon become in a wretched and dilapidated condition where decay has started and provide a breeding place for germs and the collection of dirt. It behooves us, therefore, to keep our buildings in repair and to protect them from the elements, if we would wish to give to our farms the appearance of cleanliness, thrift and prosperity. This is especially true in the case of our dairy and stock barns.

At the last session of the Legislature, Pennsylvania's first Paint Law was enacted which regulates the sale of Paint, Putty and Turpentine. This law became effective the first of last December; and as we have had for a number of years a good Linseed Oil Law, the Secretary of Agriculture is now authorized to keep his watchful eye on the character of all paints, oils, putties, and turpentines which are sold in the State. A few years ago one of our Specialists, in his report to this body, described the character of paints, going somewhat into detail as to their composition and advocated that steps be taken to have such a law adopted. After a number of unsuccessful attempts, we are now gratified to report that the Department of Agriculture can have something to say as to how these painting materials shall be labeled and sold in Pennsylvania. Only a few other states have paint laws at the present time, and while our law is not as strong in its requirements as it might be, it is a step forward in constructive and necessary legislation. The law does not require the formula label or chemical composition to be placed on each can of paint, but it does require that nothing shall be placed on the label which "shall bear any statement, design or device regarding the ingredients or the substances contained therein—which shall be false or misleading in any particular." This means that hereafter mixtures of a small percentage of white lead and the balance clay,barytes or such inert material cannot be sold for "Pure White Lead." It means that diluted pigments and the many diluted colors in oil can no longer be sold in Pennsylvania for the pure and full measure articles, for from now on all painting materials which are manufactured and offered for sale must have clearly stated on the label the net weight or measure of the contents, the true name of the product and the name and address of the manufacturer or importer.

It is advisable to here call your attention to the fact that the law does not control interstate shipments of paint such as is sold by large mail order houses or retail stores where shipment is made direct to the consumer. When buying paints, therefore, it is well to bear this fact in mind as, no doubt, it would be safer to purchase paints sold in the State by reputable and responsible firms who place the name of their company on the cans and in many cases show the chemical composition of the same. Since the passage of the paint law, it has developed that quite a number of legitimate paint products were being sold which had their special and proper place in the trade and which were diluted it extended but which were labeled and sold as pure or full strength articles. This situation is interesting as it shows that we were badly in need of a paint law. Many of the manufacturers of these articles have arranged to properly label their goods and have sent many of such labels to the Department for examination. Under the provisions of the act, the Department cannot object to the sale of these half strength or extended paints and colors providing they are properly labeled to show they are extended. A ruling has been made, therefore, that these materials shall be labeled in a plain and conspicious manner as a "Compound," therefore, when any of you gentlemen go to a supply house to purchase Pure White Lead, Pure Zinc, Pure Colors in Oil, Pure Turpentine and Putty be sure and look for the word "Compound." If you find it on the label you will then know that these materials have been "extended" as the trade call it, with varying amounts of Barytes, China Clay, Calcium Carbonate or some other "extender." As previously explained, these extended materials have their proper use in place of full strength lead, zinc and colors. For example, it is recommended by many expert painters that for an outside white paint a mixture of 75% of white lead and 25% of zinc white be used as such a paint retains its white appearnce longer than if pure white lead were used. In the case of certain colors, it appears that where it is desired to produce a certain shade or tint in a mixed paint, it is more desirable to use an extended color as it is less difficult to thoroughly mix it with the pigment and oil than is the pure full strength color.

In the case of the many mixed paints the Department can only direct that a full measure be given and that no false claims be made as to the composition. It cannot require that the ingredients be shown on the label, but it can prohibit the use of mineral oil and excessive amounts of water which have frequently been found present in large amounts in some grades of mixed paints. It is not the purpose of the Department to attempt to advise as to what kind of paint or what brand of paint should be used; but when certain paints are being illegally sold we shall not hesitate to notify you to this effect. The question of the proper kinds of paints to be used for the many different uses is a problem for the expert painter.

We propose to analyze samples of the various paints on the market and tell you of what they are composed. We have equipped a laboratory especially for this work and with the limited means at hand, we are now arranging to collect samples of these products and analyze them during the present year. Unfortunately we are handicapped at the present time by lack of sufficient funds to carry on this work as it should be done, for the reason that only $3,000 for the fiscal period was given us to protect the consumers of this great State from receiving falsely labeled and adulterated paints. We can, however, get a splendid start and it is hoped at the next session of the Legislature sufficient funds will be given us to enforce the provisions of the new paint law in a satisfactory manner to all concerned.

REPORT OF THE ENTOMOLOGIST

By PROF. H. A. SURFACE

(a) *New Methods of Pest Suppression*

During the past year the chief advance that has been made in regard to methods of pest suppression has been along such lines as of fumigation of the soil (chiefly with carbon bisulfid) for soil-inhabiting pests, fumigation of grain during warm or temperate weather for the destruction of grain pests, spraying with a coarse spray or sprinkling with large drops of sweetened poison spray for such pests as the fruit flies (including the Railroad Worm or Apple Maggot) and the root worms of cabbage and related plants, radishes, turnips and onions.

The use of tobacco decoction with a little soap added has proven highly satisfactory for the destruction of suctorial insects, such as aphids, young plant lice, redbugs, leaf hoppers, etc., and also for mites, red spiders, etc. One ounce of tobacco extract and one quarter pound of soap in four gallons of water has given good results for such pests.

The destruction of Lecanium scale with lime-sulphur solution, applied thoroughly while dormant, one-third stronger than for San Jose scale, or specific gravity hydrometer test of 1.04, has been fully demonstrated, as was also the prevention of damage by the Codling moth by means of lime-sulphur spraying without the addition of arsenate of lead.

(b) *New Features of Control of Insects Generally Established*

For the scale insects nothing is better than strong lime-sulphur solution applied during the dormant season; but we have demonstrated that for the control of the *Lecanium* this material must be used one-third stronger than for the San Jose scale, or specific gravity hydrometer test of 1.04.

Altho the Codling Moth has been controlled by spraying with lime sulphur solution alone just after the blossoms fall, repeating this in two weeks, and again in two weeks after that, without the use of arsenate of lead, the formula that we recommend as best for this pest consists of one gallon and one quart of concentrated lime-sulphur solution, homemade or commercial, and one or two pounds of dry arsenate of lead, in forty-nine gallons of water.

The much-dreaded root maggots of cabbage, turnip, radish, onion etc., have been controlled by spraying with a coarse spray, or by sprinkling with drops, of sweetened poison solution of the foliage of plants before the female flies lay their eggs, so that these adult pests are killed in the process of feeding.

The prevention of borers in fruit trees by the use of lime-sulphur solution containing sediment, making about three applications per summer, as a wash or coarse spray, has been further demonstrated. One quarter ounce of arsenate of lead can be added to this with safety, but is not essential.

The Corn-ear Worm was unusually bad last year, but can be controlled by dusting with one part of dry arsenate of lead in six parts of sulphur, making about three applications at intervals of two or three days each, commencing when the silk first commences to show on the young ears of corn.

(c) *Insects Newly Introduced or Not Yet Widely Spread in Pennsylvania*

We have a report from the southern part of Clearfield county of a remarkable outbreak of the insect known as the Walking-stick *(Diaphomera femorata)*. They defoliated vegetation of nearly all kinds, including fruit trees and forest trees, over an area of some acres. The dropping of their eggs on the leaves under the trees sounded like the falling of rain. These pests can be killed by arsenical spraying, or their eggs can be destroyed by burning them on the ground among the fallen leaves, where they remain exposed during the winter.

A newly introduced pest in Pennsylvania is the European Hornet *(Vespa cabro)*, which did considerable damage to the peach twigs of Mr. J. A. Faust, of Mowersville, Franklin county, Pa. These worked by eating away the bark and cambium of the twig, as shown by specimen herewith submitted. This is the first report of the European Hornet in Pennsylvania, altho it is known as introduced and very destructive in the State of New York. It is possible that during its feeding period it can be destroyed by spraying with one-half ounce of arensate of lead in each gallon of water, applying this to the twigs on which it feeds. Sweetened poisoned liquid is also recommended. Its marks are conspicuous and characteristic. It makes a paper nest, as does our American hornet, but is more liable to nest in holes in trees, in the ground, or in stone heaps. Where there are evidences of its presence, as shown by injured twigs, its nest should be sought and destroyed.

The Apple Seed Chalcis has continued to be destructive in the northern part of Pennsylvania. We have worked out its life history, and know that this insect inserts an egg by means of its long ovipositor when the fruit is about the size of a robin's egg, reaching the seed in which it feeds as a young larva, developes, changes to a chrysalis and passes the winter. The fruit may hang on the tree, or fall to the ground. It bores out through the seed and fruit in the spring to produce another generation. The best possible means of suppression is to destroy all fallen fruit, and all that hangs upon the trees in winter. Pasture with pigs or sheep. This pest causes the fruit to remain very small, stunted and irregular in shape.

The Railroad Maggot was not as bad as some years, but it continued destructive in summer apples, especially sweet varieties, in the regions drained by the northern waters of the Susquehanna River. The use of a coarse poisoned sweetened spray, or drops of this liquid, on the lower limbs of trees in infested regions will destroy the insects before they lay their eggs.

The Pear Midge is spreading in the southeastern part of Pennsylvania. Hundreds of little fly larvæ or midges may be found as minute maggots in the fruit of the pear when it reaches a size as large as the end of a man's smallest finger. The fruit swells and drops, and the pests come to maturity within it. Spraying just after the blossoms fall with tobacco decoction or soap solution, repeated in two weeks, should suppress these pests.

The Pine Shoot Moth has been found by our inspectors doing damage to pine trees in certain parts of the State where it has been introduced recently. It should be watched, and cut out and burned, or it will result in considerable loss and deformity to pine trees.

The Pear-leaf Blister-mite continues to be a serious pest to pear and apple. When the leaves commence to look as though soot had been rubbed into them in blotches, they should be sprayed once per week with tobacco decoction and soap, or with kerosene emulsion.

The Angoumois Grain Moth has continued to cause much loss in the southeastern quarter of Pennsylvania. It is spreading and needs attention. Fumigation when the temperature is above 60 degrees, with one pound of carbon bisulfid for each one hundred cubic feet of space occupied by the grain, is effective.

(d) *Native Insects with Modified Habits*

It is my great pleasure to report to this Board some new and important discoveries by the Bureau of Zoology of the Pennsylvania Department of Agriculture during the past summer and fall, concerning two important insects which almost suddenly became abundant and destructive, and the habits and native food of which were not known until these investigations were made, and have not been published anywhere before this time. These insects are the Red Leaf Beetle *(Galerucella cavicollis)* and the Poplar Beetle *(Lina tremula)*.

Two years ago there were a few reports of damage to the leaves of cherry and peach trees by the Red Leaf Beetle in Lycoming county. A year ago there were reports of injury by this pest in the counties adjoining Lycoming. Last summer there were reports from more than a dozen counties of northern and central Pennsylvania, that this insect was severely damaging peach and cherry trees, and in many cases attacking apple, pear, plum, and even some herbaceous or smaller cultivated plants. Dr. L. O. Howard, U. S. Etomologist, informed the writer that the native food plant and the habits of this pest were not known. We took up investigations at once, and discovered that its native food plant was the wildfire cherry (***Prunus Pennsylvanicus***).

In our investigations we found that its larva feeds only upon this plant, while the adult beetle feeds upon other trees and shrubs, as mentioned above. The adult beetles come forth in the latter part of the spring, feed upon the leaves, mate, go down the trunk of the tree to near the surface of the ground, and lay their eggs in rubbish, or on the ground, or on the bark of the trunk just above the ground. The larvae hatch and crawl up the trees to the leaves of the wild cherry on which they feed. After they become grown they come down the trees again to pupate at the surface of the soil. After they transform the adults go to the leaves to feed again, and then scatter and find protected places to pass the winter, chiefly in rubbish. Thus its life cycle is worked out showing one brood per year, and here published for the first time, with statements as to its native food habits and remedies.

The remedies are easily applied as they consist in spraying with nothing more than arsenate when either the adult beetles or the larvae are feeding. We recommend one ounce of arsenate of lead in one gallon of water. On the peach make it half as strong. The destruction of the fire cherry is also recommended to effect the destruction of this pest, as it would then be exterminated or obliged to change its larval feeding habits, if possible.

In this connection I am glad to report that our Field Assistant, Mr. H. B. Kirk, had opportunity to make observations on a closely related beetle, which likewise is not generally known. Because this pest feeds on the Aspen or Trembling Poplar *(Populus tremuloids)* we call it the Poplar Beetle *(Lina tremula)*. Altho other species of poplar were near at hand this insect was found to feed only upon the poplar correctly called the Trembling Aspen. Of this beetle there is but one brood per year, with habits similar to those of the Red Leaf Beetle.

(e) *Some Insect Friends*

We must not lose sight of our beneficial insects, as there are really more species that perform services for mankind, than there are that destroy his property. For example, we well remember when the destruction of bumble-bees was thought to be the proper thing. We have known farmers to carry straw to burn their nests. Now we know that clover and allied plants are essential in building up soil fertility, and that to produce the seed of such plants the bumble bee is an essential agency. Whether they be internal parasites, like the effective destroyers of the San José scale, or predaceous insects, like the Lady Bug, the Lace Wing larva, or the ground beetle or whether they be scavengers, like burying beetles and flesh flies, dragon flies destroying mosquitoes, or whether they be pollen carriers for the fertilization of blossoms, there are hundreds of insects worthy of our study and preservation.

(f) *Effects of Vertebrate Destroyers of Insects*

Attention must be called to the efficiency of birds, mammals, reptiles and amphibians as destroyers of insects. The spray pump is but a temporary palliative. Where it is possible to get these natural enemies of insects to work for us we are using Nature's method and gaining ground. Further studies convince us of the importance of recognizing and preserving our various insect enemies.

(g) *Obnoxious Bounty Laws*

One of the best known men in Pennsylvania, who is interested in the conservation of wild life, recently wrote to us that he wondered how long this State would continue to suffer from depredations of hordes of rodents and myriads of insects, because of its bounty laws, which not only permit the destruction but place a premium upon the enemies of our obnoxious creatures. Let us not take it for granted that the owls, hawks, foxes, skunks and the weasels are the enemies of the agriculturist, but rather let us comprehend readily that without the co-operation of such creatures we shall have greater difficulty and expense than ever before in making the soil yield returns for the laborer.

VOCATIONAL AGRICULTURAL EDUCATION

By PROF. L. H. DENNIS

It is sometimes necessary, these days, for a man who contemplates speaking upon any agricultural subject to first qualify himself, because there are so many persons talking about this subject who, some people think, have no license to talk upon it. I am reminded of that little paraphrase that runs something like this:

> "Lives of great men are all reminders
> That there's one unfailing song;
> If a name we'd leave behind us,
> Just be born upon a farm."

And so the man these days who can say, "I was born and raised on a farm," has said enough to qualify him in the minds of a great many people to speak upon an agricultural subject. I am not sure just what merit there is in the fact of being born upon a farm; I can say, however, that a boy can learn much and get much valuable agricultural experience if he is raised upon a farm. Now it happens to be my misfortune, if such be the case, not to have been born upon a farm, but to have lived upon a farm as a boy and to have had various experiences which I will not relate at this time. The fact of the matter is, it would not do, probably, for me to relate some of the experiences that I enjoyed on Sundays and other days when the folks went to town and left me in charge. I well remember one incident, however: In my days we used to plow with oxen and used them for various other purposes also, and I recollect that I did not enjoy the plowing with those oxen as much as I did the Spanish bull fight that I used to put on in the barn-yard when the folks were away in town. It was very fortunate for me, I suppose, that the folks never found out what my chief diversion was while they were away.

I am glad indeed to appear before you this evening and, in as modest a way as possible, attempt to give you some idea of what Pennsylvania is doing along the lines of Vocational Agricultural Education in the secondary schools of the rural districts. In these stirring times, when one nation is at war with another nation, when there are wars and rumors of wars, when the air is full of "preparedness" and intervention, anything that smacks of militarism is more or less popular and gets a ready hearing. I sometimes feel that it is wise for us to pause, even in times like these, and turn our thoughts away from destructive militarism and center these thoughts upon some of the constructive phases of our National life, such as the tilling of the soil.

You know, as a nation, we are more or less inclined to be hero worshipers. This has been emphasized very prominently in the past in the teaching of history in our public schools. The great men of this nation have been held up before the minds of the rising generation chiefly because of their services as statesmen or soldiers. I am not so sure but what we ought to do this; I think these men deserve the honor due them for such services; I believe there is a greater value in it, however, because of the stimulating effect it will have upon the civic life of the coming citizens of the Nation. I believe, however, that it would be a mistaken policy to neglect the study of the private and business life of these great leaders, for it seems to me the character of an individual is so developed by his private and business life that it determines, to a great extent, the type and amount of public service he is able or willing to offer. It is rather interesting to note that some, and in fact all of our text-books on history refer to George Washington, the central figure in this group, many times with reference to his services as a soldier; many times also in connection with his career as a statesman, but very seldom refer to him with reference to his occupation as a farmer. Now we know that George Washington lived on a farm, or rather a large plantation, in Virginia. We also know that Thomas Jefferson, another one of the great leaders of our country, was a farmer. We do not know him as a farmer, probably many persons are not aware that he always gave his occupation as that of a farmer. It is interesting to note, however, that it was only in the business of farming that he failed. He made a success of nearly everything else he undertook, but in farming he was not a great success, although he was a great lover of farming. Thomas Jefferson realized that the business of farming was indeed a big business. He realized some of its limitations in his day. You will recall, many of you perhaps, that he made some suggestions for the improvement of the plough of his day, which was a very crude affair. Thomas Jefferson, George Washington and Benjamin Franklin and other leaders of that day realized that there was a great need for more reliable scientific information concerning the great business of farming. I emphasize that they realized that way back in their day, and the fact that they did realize this showed itself in the formation of the first American Agricultural Society in the City of Philadelphia in the year 1785. George Washington and Benjamin Franklin were both members of this first American Agricultural Society. It was this first American Agricultural Society that really caused the development in Pennsylvania of the Pennsylvania Agricultural Society, established in 1851, if I am not mistaken, and this later led to the Pennsylvania Board of Agriculture, then called the State Board of Agriculture, and out of the activities of this State Board of Agriculture grew the very efficient Department of Agriculture which we have in our State today.

It is probably entirely unnecessary, when speaking before a body of this construction, for me to refer to the various branches of the Department of Agriculture of our State. They are carrying on many lines of agricultural endeavor in this State, and carrying them on so well that it would almost be out of place, I was going to say, for me to dwell very long upon this subject. I felt, however, that I wished to refer to it because I wanted you, first of all, to realize that the subject of Agricultural Education, in itself, to which I shall very shortly come, is not as new as some people would think. I want you to realize a little bit more fully perhaps than some of you have, if that is possible in such a talk as this, that that need was deeply felt in those days and that the agricultural agencies which we have today are possible because the agricultural leaders of a half century, yes of a century ago, realized that need as we do today. I will throw upon the screen a few slides showing some of the activities of our own State Department of Agriculture.

There are many other lines of activities carried on by this Department that are just as much entitled to recognition as those I have shown here tonight, but time forbids my touching upon them. It may interest you to know that this State Board of Agriculture has been responsible for many lines of agricultural development in this State. It was this Pennsylvania Agricultural Society which later became the State Board of Agriculture, founded in 1851, as I stated before, that was really responsible for the founding of our State College of Agriculture. In 1853, just two years after the founding of the Pennsylvania Society of Agriculture, this Society recommended that an agricultural school be established in the State. The matter laid over until 1855, when the farmers' high school, as it was first called, was established. From the institution, in 1861, there was graduated a class of eleven students. This was probably the first class graduated in this country from an institution that was purely agricultural. My friends, there has been a marvelous development since that day. The class of eleven in 1861 has grown until today the enrollment in our splendid State College of Agriculture is somewhere between 3,500 and 4,000; the exact figures I do not have. It shows the merit of the institution. In 1862, Congress passed what is known as the Land Grant Act, by virtue of which each State receives certain grants of land, on the proceeds of the sale of which money was available for the support of these institutions, in part, provided the several states took advantage of the provisions of this Act of Congress by passing acts which gave the College State support, and the State has been committed ever since to this policy, of financially as well as morally and otherwise, supporting this State College of ours. It is an obligation on the part of the State.

The greatest work, it seems to me, that the State College is doing today—and they are carrying on many very valuable lines of work—one of the greatest lines of work that the College is doing today is the work of preparing agricultural leaders. My friends, I hope we all realize that this business of agricultural development, if we might so term it, is big enough, is so important to all the people of the State and the Nation at large, that it needs all the men that we can get. We ought to welcome the graduates of all our agricultural colleges; we ought to welcome all agencies. The business of farming is as important today as it ever was in the history of this country. The fact is, it is more important. These figures will give you an idea of how important it is. In 1890, 51% of the people of Pennsylvania were rural; today somewhere between 35% and 38% of the total population of Pennsylvania is rural. His Excellency, the Governor, this morning told us this, that only about 11% of our total population are farmers, and that percentage is slowly decreasing. A study of the population's statistics of the various counties of this State will show you that nearly every county in this State has lost in rural population, not only relatively but actually. It is a fact that the majority of the townships in Dauphin county and Cumberland county have actually lost in population since the year 1890. You may realize what the decrease in the rural population might be relatively, it might be that certain rural district had more people today than they did in 1890 and still they might have a smaller percentage of the total population than in 1890; but the fact is that there has been an actual decrease in many of the rural townships as well as a relative decrease.

Here is the thing I want to call your attention to, regardless of the causes of this decrease, and it is a rather complex matter and I cannot go into it in detail, but regardless of the causes, here is the fact that makes this of importance to you and to me and to every person in this Nation of ours; there is a smaller percentage of the total population of this State and of this nation living in the open country and engaged in producing the food supply of the entire country than was the case back in 1890. I say that is of importance to the man in the city, it is of greater importance to him today than it was in 1890 when a larger percentage of the total population was living in the country. We are all familiar with the poem, "Still sits the school-house by the road, a ragged beggar sunning," and that brings back to our minds many pleasant recollections. The reason we like that poem, as you see, is because that poet made it a true picture. He knew whereof he wrote "A ragged beggar sunning." I wonder if this rural school (slide) could ever lay claim to making country life more attractive. Why, the very activities within the walls of this school rotated around the life and activities of the city and its business. Is it any wonder with boys and girls attending such a school as this—that in their hearts should arise the hope that some day they might go to the city to live and to work? I am glad to say that the people of the country are beginning to realize that it is more easily possible for them to have ideal school conditions than it is for the people of the city. The time will come when every school in the rural district as well as in the city will become the pride of the community the year around. If the school is to lay any just claim to raising the standard of home and living conditions in the community in which the school serves, it can only be because the school itself represents a higher standard than the average home of the community; otherwise, the influence of the school cannot be that of raising the standard of the average home.

My friends, this is a township high school (showing slide); moreover, it is a joint township high school operated by two townships. It is the type of school, my friends, which I believe we shall have to establish throughout the rural districts if we are going to get secondary education of equal efficiency and value to that offered in the high school of the city. You will note that there are 10,606 one-room rural schoolhouses in this State, of which 886 have ten pupils or less and 592 of which have been closed during the past ten years, partly due to the fact that many of our rural townships have actually lost in rural population, as I stated a few moments ago. I believe that either partial or total consolidation of schools will, in some measure, help us to solve the question of satisfactory, efficient rural education. I believe those of us who are from the country—and I want you to realize that in any remarks I make, I'm including myself—I think those of us who have anything to do with life in the open country will have to admit that we have come along just a little bit more slowly in the country in educational development than they have done in the city. It takes us a little bit longer to become open minded on some things. Every farmer is from Missouri, he must be shown. I believe that is a good thing; we should not rush into those things, we should examine any new feature of education, any new line of activity, very carefully before making any very definite move toward inaugurating any new system.

May I call your attention to the fact that every slide I shall show you here this evening is a view of a Pennsylvania scene. I am enough of a Pennsylvanian to believe most heartily in Pennsylvania. I am so glad that our chief executive, his Excellency, the Governor, is trying to propagate the idea all over this State that we must love this great State of ours, that it is big enough that we can take a great pride in it. As Pennsylvanians I believe we have been rather slow to boost it, if I may be permitted to use a slang phrase. This slide shows a township high school out in the open country. In the township adjoining this there is another consolidated school where they operate fourteen or fifteen school wagons. I do not believe that consolidation is possible in all the rural districts. Partial consolidation will help us to solve some of the difficulties; in other cases, total consolidation. We have both in operation in Pennsylvania to-day. We have made more progress along these and other lines than the people of Pennsylvania are aware of. The reason is this: We are not given to boasting quite so much in Pennsylvania; just the moment we think of an idea, we don't put it into the newspaper, we try to work it out and let the works speak for themselves; that is why the people of Pennsylvania sometimes point to other states for examples in certain lines of work that have been carried on, certain educational ideas that have been developed, when right within our own borders we have had those same things for eight or ten or twelve years. I am proud to say that the views we are using to-night are all Pennsylvanian.

When we learn that the township lines sometimes stand in the way of the development of efficient secondary education, when we learn that the high school or vocational school of the open country must be a school which serves a certain community instead of a set area of land, then and only then, as I see it, will we have a school that will not only equal the good high school of the city, but, in some cases, surpass it, because we have facilities in the country, when we once learn to make use of them, that the city will never have. The joint school of the country, as it will prove to be in many cases, will give us a high school or a vocational school of such size that we may have a faculty of four, five, six or seven teachers in this particular group.

The faculty in the vocational school in one of the west central counties. In this group are three college graduates, one man trained in agriculture, a man who was born and raised on a farm and a man who has had teaching experience, a man who is a graduate of our State College of Agriculture, and two of the others were especially trained along the lines of music and drawing. We can never hope to get a faculty of that size, having the training and ability I have just mentioned, in our small, third class high schools. Splendid work has been done by the school districts in the country, don't misunderstand me; splendid work has been done in the development of the high schools of this State but it is only a beginning, it is a step towards something else still better. This is a group of students in a secondary school of higher vocational education. Schools like this right out in the open country will make some things possible that never will be possible in any one teacher third grade high school.

It seems to me that if we are going to have well trained teachers in the country, there are two or three things at least that are vital. In the first place, we must pay such salaries that we can attract and demand well trained teachers, teachers that are trained for this line of work, prepared for this line of work. The compensation must be adequate enough to hold the good teachers, those that prove themselves to be successful; and third, we must have teaching conditions attractive enough at least to hold the teachers in the country. What the country needs all teachers who know the needs of the country, who understand conditions, who have lived in the country, who will come out in the country and live there, not board there, not stay just during the day, but who will come out and live in the community and become one of the people. I believe that is essential. There are those educational leaders who believe that in order to get this we shall have to provide homes for our teachers. That may be a disputed question at the present time; I merely call your attention to it.

This happens to represent a home belonging to a school district and the Board of School Directors have placed this home at the disposal of the principal of a consolidated school. Now there are some people who may think that in a public school the teaching of agriculture is more or less new. I want to again emphasize the fact that agriculture as it is being taught in our schools, is no newer than the need, the realization of the need for agricultural information. In 1825, there was an agricultural school established in Maine; in the year 1916 agriculture is taught in the public schools of every state; it is taught in over two thousand high schools in Pennsylvania; it is taught in twenty-one counties on a vocational basis. I realize, as well as any one else, that there is some very poor teaching in agriculture being done, that mistakes, grave mistakes, have been made in the teaching of agriculture in our schools that have brought severe criticism and condemnation upon the whole matter of agricultural education. I realize that many teachers who have attempted to teach this work have not been prepared. I also realize that it has been an almost impossible task for a teacher unprepared, having text-books not suitable for public school work—that it has been an almost impossible task for them to go into a school and do any kind of teaching along agricultural lines. But a beginning must be made, we profit by the mistakes we made more than by the successes with which we meet, and I think that Pennsylvania has profited quite largely by the mistakes made in the public schools. We are still making mistakes and probably will continue to do so.

The question of teaching agriculture on a basis satisfactory to the educators, the farmers, the boys who are taking the work, is in a process of evolution yet; we realize that. The school code of 1911 gives school districts all the authority they need, practically all the authority they need, to establish agricultural schools of various types. The vocational education act of 1913 provides specifically for agricultural departments in high schools and special vocational agricultural schools, sometimes known as farmers' high schools or agricultural high schools. Usually in this State they are referred to as vocational schools or agricultural high schools.

You will probably be interested to know the distribution of these agricultural schools. I wish to tell you what determines the location of an agricultural department in a high school or a vocational agricultural school: First, the community must need that type of education; second, they must want that type of education; and in the third place, they must be willing to carry it on as it should be conducted. That accounts for the distribution of these agricultural high schools over the State of Pennsylvania. Some districts have been very anxious to have them. I wish to state also that there are a number of counties not marked up on this map which have filed applications with the Department of Public Instruction asking for State aid, the special State aid granted to carry on this work, and their applications are being considered at the present time. I would like to call your attention to the fact that there are but two counties on the northern tier of counties in which there are no agricultural high schools, McKean and Warren. I am glad to say for those counties that we have several requests from each of those counties. There are men in this audience tonight, members of the State Board of Agriculture, who have always stood behind agricultural education; there are members here to-night who have spoken to us with reference to the establishment of such agricultural high schools. In reading over the history of the Pennsylvania State Board of Agriculture, I was interested to find the number of times at which different members of the State Board referred to the necessity for agricultural education in the country. There are but two counties on the western frontier, Beaver and Lawrence, in which there is no agricultural high school. There is one county, Mercer county, which now has four of these agricultural high schools. Some of the states in the Union have established congressional district agricultural schools and some have established county agricultural schools. It is not necessary to explain them, because the name in each case explains the school, there being one school to each congressional district in the one case, and in the other case, one school to each county, and these schools attempt to serve the areas indicated.

But from our investigation we have found that it is impossible to serve a community of that area; it is not a community; it is simply a set area of land. In Pennsylvania we believe that secondary schools should be near enough to the people that the boys and girls of high school age can come to the school in the morning and return to their homes at night. Farmers need boys who are of high school age, and the boys and girls of high school age need their homes during that period in their lives. For that reason, instead of making large appropriations to any one school which would attempt to serve a congressional district or a county, that same amount of money is divided up into smaller portions and distributed throughout the State in small portions, each portion going to a community, so far as it is possible to distribute it.

This is rather a poor slide of a very good school, the Hickory Vocational School in Washington county. There is one man in this audience who lives within a stone's throw of that school. This is a vocational school; in this school there is operated a four year course in agriculture and a four year course in homemaking for the girls; on this basis of one half of the day, the boy is with the supervisor of agriculture; the other half of the day he is in what you might term the high school; that is to say, he is studying academic subjects. He does not study agricultural subjects or practical subjects the full half day; it amounts to about 40% of his time. All boys in these vocational schools are required to take a vocational course for the first two years, getting the practical work with the academic work, not in place of it.

And, my friends, let me insert here, that this move to introduce vocational education in the rural district is not revolutionary in its character by any means, it is evolutionary, we are adding the practical work to the academic curriculum, rather than replacing the academic work. The girls are required to spent part of their time each day in vocational work for the first two years. At the end of two years, both boys and girls have the option of continuing in such a course or finishing in what might be termed an all academic course or all high school course. George Washington pointed out the fact that it was necessary in his time, and is necessary now—he pointed out in his time that a study of the soil should be made in order that its needs might be determined, in order that we might make it yield more than it does, in order that we might take care of it better. It is hardly necessary to state then that in an agricultural school we should have agricultural laboratories so fitted up that the boys in the class in agriculture might make a study of the soil. The work in the soil consists of theoretical work, if you wish to call it so. There must be some organizing of your information and that, I suppose, might be termed theoretical work. There must be some organization of that material, in order that the practical work in the laboratory and the field might not take up useless time, in order that time might not be wasted. The so-called theoretical work is followed by experiments in the laboratory and trips out into the field where the various types of soil are studied. It frequently happens, where we have these agricultural high schools located, that the boys in the class, with the help of the teacher, and sometimes with the help of the other members of the class, will make a complete soil survey map of their own home farm. As I partially explained a few moments ago, there are two ways in which an agricultural course may be added on to a secondary school in the country; either it may be added as a Department of Agriculture to an existing high school, or a complete vocational school may be established.

This slide represents a school in one of the western counties of the State. The old building on the left is the high school building; the new addition houses the Department of Agriculture in which a four year course in agriculture is given. In charge of that department is a man who devotes twelve months of the year to his work. One of the earliest schools started in this State was at Troy, in Bradford county. That school was so successful that the people authorized a bond issue in order that an addition might be built to their high school building to properly house the Department of Agriculture. The old building on the right is the high school building. In this addition there is an agricultural laboratory, poultry room, dairy room, wood shop and a blacksmith shop. Field trips of all kinds are taken. Various methods are employed to take these field trips. Usually the boys walk. Very naturally, in some of our high schools, it happens there are enough farmers' boys who own automobiles or whose fathers' own automobiles, that it is possible to get the use of these automobiles while making their field trips. Quite a number of very interesting trips have been taken through the counties in which these schools are located. It would be impossible for me, in the brief of this lecture, to go into details with reference to any of these trips.

Poultry raising is of course a great interest to boys. If interest in poultry raising qualifies one as a boy, I suppose most of us here are boys, because most of us, particularly the men folks, are interested in poultry raising, and there is many a man who has made a stab at poultry raising, and some of them are now wiser. All kinds of practical work are carried on in connection with the study of poultry raising. In these schools a study is made of the various methods of killing and dressing chickens to put them upon the market. After this study has been made, the supervisor of agriculture gives a demonstration showing how the chickens should be killed and dressed according to that particular method he has described. This is followed by work on the part of the boys. In some schools where we have a homemaking department in connection with the Department of Agriculture, we are able to correlate the work very nicely, the boys killing and dressing the chickens and turning them over to the girls, who cook and serve them. The boys correlate again on eating them.

This is a group of boys in one of the first departments we established in Erie county. The town of Waterford, in Erie county, has a very live poultry association and conducts a poultry show. These boys are interested and desired, when the time came, to submit some birds, and they did. In the shop work they built every one of the coops shown on this slide with the exception of one which was the model from which they made their own. They also had an agricultural exhibit. Mr. Wittman of the State Board of Agriculture, visited this class and took the boys on a tour of the town. He visited a number of the chicken pens of the town by daylight and gave the boys a number of very valuable hints on the subject of poultry. Farm forestry is also one of the subjects of the four years' course in agriculture in these schools, not forestry as a profession, but farm forestry as applied to the farm. It seems to me that any boy, that every boy has a right to expect that his school shall train his hand as well as his head. That is particularly true of the boy in the country. I believe we make a mistake when we train the boy's head alone. In order to give the boy an all around development, I believe we must make provision to train his hand and his head and his heart. Blacksmithing is a part of the four years' course in agriculture. Woodworking of various kinds—this happens to represent a class in rope splicing. The boys take a keen interest in this work. Harness repairing, as it is practiced on a farm, is also taught in these schools. The boys are taught how to use tools, how to take care of tools, they are taught the various processes connected with the use of tools. The work which they do is not the manual training of to-day, good as that is, but it is what you might term applied manual training, it is applied shop work, it is what we like to term farm shop work. The things the boys make while they are learning the use of tools and the processes involved in using the tools have some direct bearing on the working of the agricultural course, some direct relation to home farm life. These boys built this colony house. There is a correlation between shop work and poultry raising.

It is hardly necessary to point out that a four years' course in agriculture would be incomplete without a study of farm crops. This one slide will give you a very slight idea, a brief glimpse only, of a part of the practical work carried on in connection with the work of farm crops. These boys are looking over the result of a germination test of corn. The boys are taught how to select and store corn and carry on the germination test. These boys, in connection with their work in vegetable gardening, planned out, drew the plans of and made a hot-bed and planted therein certain vegetables. Here you will note them glazing the sash; they made and glazed the sash. Perhaps that is hardly a very practical exercise, because as a rule a man buys his sash rather than making and glazing it, and yet for one illustration perhaps there was no valuable time lost. This second slide shows them completing the hot-bed. This again is correlation between the farm shop work and the vegetable gardening work. Dairying is a very important industry and in many of our counties if the teaching of agriculture in our schools is going to be of value, it is because it is practical, it is because we are teaching the boys to work with things rather than to talk about things. This means that it will be necessary for us to have, as we do have in these agricultural schools, it will be necessary to have laboratories fitted up with dairy apparatus; it will be necessary to make frequent trips to dairy farms.

This slide explains itself. I think you will realize that it will be impossible for me to give you more than a glimpse into the various utilities of these schools. The one thing I want to leave with you is this, that an attempt is being made to make the work through and to make it practical, to connect up the work of the school in a very definite way and in a practical way with the work of the home and the work of the farm. Every boy who takes this four-years' course in one of these agricultural high schools must each year carry on an agricultural project. This is another illustration of the attempt to connect up this work with the home and make it practical. This boy chose a poultry project. He hatched out as many eggs as he could from the eggs you see there. He selected the male birds and caponized them and in the fall he put on some very healthy specimens of capons. The boy received a great deal of valuable information in connection with this and received some financial remuneration.

This boy is a freshman in a small agricultural high school and decided that he would like to grow some tomato plants. He was very much interested in tomatoes. He planted fifteen hundred tomato plants, or secured that many from the number of seeds be planted, and transplanted them and took care of them. Every boy who carried on an agricultural project under the close supervision of the supervisor of agriculture, must keep a daily record of everything he does, his expenses, the work that he puts on, the methods that he employs, in order that he may learn some lessons thereby. From that record we know that this particular boy went out one night, on the night of the fifteenth of June; it happened in that year and covered up this many of his fifteen hundred tomato plants with newspapers to protect them from a frost which his daily record shows came that night, a very heavy frost. His father did not cover his plants up and lost many of them. This boy bought for himself a canning outfit and later in the Summer a second outfit, because he was so successful in canning these tomatoes and other vegetables; he put his own brand of canned corn, tomatoes and beans upon the market, and at the close of the season he had not only had a kind of work that kept him interested and out of mischief, but he had also cleaned up the tidy sum of $130.00. It seems to me that there is value in that.

May I call your attention again to the fact that the supervisor of agriculture in these high schools is employed for the year around? He stays there during the Summer and visits these boys as frequently as possible for the purpose of giving them instruction in connection with their agricultural projects. Now, my friends, we have learned how to feed the hen; we have learned that the hen is an egg factory on legs—I came near saying on wheels; we have learned that if we want to make a hen produce eggs, we must feed that hen those materials which make eggs and those elements which will also carry on the body functions of the various organs in that hen. We have that down to a science. Mr. Wittman, of your own State Board, has told the people of this State many interesting things. We know that we can feed Lady Eglantine, of whom you have all undoubtedly heard, an exact ration, which will make her lay eggs without any eggscitement, and may perhaps make her a little eggotistical. (Laughter). We have learned, my friends, how to feed this happy family to keep them happy until the day of reckoning comes. We have even passed some laws providing for their comfort when traveling. I say we have learned how to balance rations for chickens; we have learned how to balance the rations of hogs so that we can make them take on the greatest amount of fat with the least possible expense and the greatest profit to us; but the thing that we have left to the last, the thing we know the least about to-day is the balance ration for the human individual.

Oh, I know there are people here and those who have made a study of this. I know that a wonderful start has been made upon it, but I mean that as a people we know little or nothing to-day about the science and art of right living, my friends. Our mothers were good cooks, our wives are good cooks—many of them; but these wives of ours and we ourselves know little or nothing about the balance ration we ought to eat, the ration which will enable us to keep in good health, to perform the work we want to do; we have left that until the last, and I believe the reason is because we can see some financial renumeration in feeding the hen a balance ration or in feeding the hog or the steer or the dairy cow; we can see how that touches our pocket-book, and for that reason we immediately get busy and make a study of that. It does not, at first glance, seem to touch our pocket-books quite so soon, the feeding of our boys and girls and ourselves, and we have left that until the last, but I am glad to say that we are making a start in this country and Pennsylvania is keeping step with the other states along this line. I know there are some here and there, some mothers, some good mothers, and some good fathers of girls like these who say that it is unnecessary to teach girls how to cook or how to sew, but, my friends, if you would make a careful survey of the conditions in this State and find out just how many girls, sixteen, seventeen, eighteen and twenty years of age to-day know anything or much about cooking, I'm afraid you would be sadly disappointed. The slides I have just shown you are views in our agricultural high schools. This is not a view of a dining-room in some mansion in the city; this is the dining-room in the home-making department of the Hickory Vocational School in Washington county. We have several others just like it. Don't get the idea that extravagance is being taught there; the very opposite is true—plain simplicity. The girls enjoy work of this kind even though there were some doubters at first, but even these doubters became earnest believers after a while. I could show you many views right along this line, but just one or two more is all I have time for, just to give you some idea of what we are actually doing in Pennsylvania. We have been at this three years; we have been at it longer than that in the teaching of Domestic Science, but we have been at the teaching of agriculture on a vocational basis in the great State of Pennsylvania for three years and we have been saying very little about it.

Some one has made a study of the process of carrying bricks from the ground up to the scaffold, and the man who made that study discovered that, simple though that operation is, yet a study of it will make possible the simplification of the operation involved in putting the bricks in the hod and the hod on the man's shoulder and the climbing of the ladder and the dumping of the bricks on the scaffold. This study enables a man to perform more work during a day with less fatigue to himself and greater profit to his employer. I am not so sure but what the simple process of laundering, if you wish to call it simple, might not stand some inspecting in some things; when I examine some of my shirts that have come from the laundry, not those that have been done at home, I am glad to say, but those that come from the hands of other people, I feel that the business of washing and ironing would stand some little inspection. Now my friends, I believe there is no reason why, just because you and I are beyond the school age, just because we have passed certain milestones in life, that the doors of the public schools should be closed to you and me. I believe you will agree with me that we know now the value of an education better than we did in the days when we were receiving the education and training that the school offers. I see no reason why the expensive school plant, which is the property of the public, should be closed so many hours in the day, so many days in the week, so many weeks in the year, or why it should be closed to those who have passed beyond a certain age. I am glad to say that we have been able to find some way in which the school plant could be of more service to the entire community in these agricultural schools.

This particular slide represents only one particular phase of the increased service that these schools attempt to give. You will notice on the next to the top shelf and the shelf just below that there are bulletins issued by the United States Department of Agriculture, by our own Department here and by our own State College Experiment Station, all classified and on file ready for instant use by any farmer served by that school whenever he wishes to ask for it. This slide explains itself. In many of our agricultural schools, particularly those that have been established for at least a year, we are conducting what we are pleased to call farmers' night schools and night schools for farmers' wives. These have been very successful. This slide represents a group of farmers in attendance at one of these night schools in one of the small agricultural schools. I emphasize the fact that this is a small school, because I wish to show that, even though the school may be small, if it has the proper facilities, the teaching force and equipment, it can serve a large community. In this particular night school there were ninety-six farmers enrolled. The evening on which the photograph was taken was a very rainy evening; the roads were almost impassible, but there were ninety-six farmers enrolled in the night school. The night school wound up with a two days' farmers' institute, I think they called it in that particular case, and I wish to say here that the State Department of Agriculture and State College have been co-operating most splendidly with our leaders in these agricultural high schools. I believe it is the beginning of a better day, as far as co-operation between agricultural agencies in this State is concerned.

I believe that one of the biggest opportunities of the day, as far as agricultural development in Pennsylvania is concerned, is the opportunity of bringing about a closer articulation between the agricultural agencies of the State in order that they may work in closer harmony. It will be a great day for Pennsylvania when some man works that problem out; it will be a great day for every agricultural force in the State, my friends. We are beginning along that line in these agricultural schools. The men of the State Board of Agriculture and farmers' institute speakers come to our agricultural high schools and deliver addresses. State College sends its men there. This illustrates the way in which the school sometimes reciprocates, furnishing a part of the program. The girls in this particular home-making department gave a demonstration for the benefit of the farmers and their wives.

Now what are we to expect from this agricultural education in our schools? Whenever any boy raises an unusually large crop of corn or an unusually large crop of potatoes, immediately his name gets into the newspaper, he gets considerable publicity. I am not so sure that that is wrong; I believe that is a good idea. Sometimes we overdo it, perhaps, but the harm that may come from this is that it may lead some of us to believe that the real purpose of agricultural education in our public school is the production of large crops. I am not saying that these are illustrations of what the boys in our agricultural schools are producing. Undoubtedly the boys who take strawberry projects may increase those and get larger strawberries. They say that two heads is better than one, even if one is a cabbage head; I presume that would be true in this case, but, my friends, what is the real purpose in the introduction of agricultural education into the public school? I tell you, my friends, it is the boy and not agriculture. The development of agricultural conditions, the improvement of agricultural conditions, as important as it is and as necessary as it is in some sections of the State, is a by-product, my friends, it is a by-product only of the work of agricultural education in the public school. It is the boy that is the key-note of the whole thing, and not agriculture. Agriculture is a mighty important by-product; agricultural education in itself would be impossible without the necessity for the development of agriculture, but it is not the production of greater crops or better crops, it is the development of this boy, it is because we wish to give this boy the type of education that he ought to have. That is why agricultural education has been introduced into the public schools.

May I refer to that slide once more? I trust you have carried it in mind; there are eleven boys in that class, in this particular school represented by this slide. They usually graduated two or three boys each year. This was a class of boys belonging to the junior class; there are eleven boys in that class, not all in the picture. Nine of those eleven boys were taking the course in agriculture in that high school; eight out of those eleven boys were over six feet tall. None of the boys in that class were less than five feet ten. The one boy in the center of the picture was a boy imported from another class merely to give you an idea of the size of the boys in the class. Why do I mention that fact? Here is the reason; we must set some standard or some gauge by which we can measure the efficiency of this type of education; we realize that. If we succeeded in holding those boys who would otherwise have dropped out of school, who would have received no high school education, it seems to me that we have done one thing to justify the introduction of agriculture into the public schools in rural districts. Again, may I refer to the fact, that previously this school graduated two or three boys only? In this class there are eleven; eight of them are over six feet in height; this shows that we are able to attract older boys, more mature boys, who would have dropped out of school if it were not for the practical work there offered. I think Luther Burbank has put it very nicely when, in urging men tho stay upon the farms and engage in plant breeding work, he says, "The time will come when more men will do this; the time will come when men's thoughts will be turned away from destructive war and will be turned to higher things, when man shall offer his brother not bullets and bayonets, but richer fruits, better grains and fairer flowers."

"RURAL CREDITS."

By HON. RALPH W. MOSS, *Centre Point, Ind., Member of the National Congress*

Mr. Chairman and Gentlemen: I wish to express frankly the pleasure which your very courteous invitation gives me. I feel it an honor to be permitted to discuss some of the great problems which lie before us. But this sense of esteem is enhanced to any Western man when his invitation comes from one of our parent states in the Union. I come far enough from the West to have been born amid pioneer conditions. I have seen the splendid farm civilization of our State spring into existence. We have improved our highways; builded modern residences; founded churches, universities and schools; and our lands have risen in value nearly to the level of European countries. Thus, in a generation, we have grown wealthy and have surrounded our families with all the comforts and many of the luxuries of life. Many factors have contributed to this wonderful growth and progress; but chief among them (and the only one I will name tonight) has been the aid and assistance which has been given us by the states east of the Allegheny Mountains.

The first farm journals which came into our homes were published in your cities; the best blood in our domestic flocks came from your herds; our orchards grew from your nurseries; our gardens were planted with your seeds; and the improved yield of our field crops was due to the improvement which your masters had wrought in our seed grains. Thus we owe to you our political liberty as a nation and our present splendid position in American agriculture.

I use the term "splendid position" advisedly and with due consideration. I have come tonight to urge certain legislative measures which, in my opinion, will enable us to strengthen our economic position as a nation by perfecting a better organization among farmers; but in our zeal as propagandists for these new measures I trust we may not forget the many exceptional advantages which we now enjoy. I have often asserted and feel free to repeat tonight, that farmers in the United States now enjoy greater advantages than any generation of men since Abraham pastured his flocks on a thousand hills. I refer of course to the splendid markets of our nation; to the well developed system of railway transportation; to the good roads which have been builded in so many sections of our country; to the improved seed grains; to the vast improvement in livestock; to the wide diffusion of scientific knowledge of agriculture among our people; to the trained leadership in agriculture and to the blessings of self-government. No other generation of farmers enjoyed at one time so many of these advantages which go to produce wealth, peace, happiness and prosperity among the great masses of people in any nation. It is fortunate for the world that the present moment finds the American farmer so happily situated. We are facing one of the great crisis in the world's history. The world is today looking to us for food and clothing in a greater degree than at any time in history. These imperative demands must continue for a generation; and if extreme privation, hunger and even starvation in the world at large is to be averted, it must be through the industry and the intelligence of American farmers. We are facing a great opportunity; but we have also a mighty responsibility. It is these grave considerations which make the present movement for a better organization and a more productive agriculture in America not only of national but of world wide importance.

Your invitation was to speak on Rural Credits. I take it that this invitation was extended because of my connection with the preparation of the bill now pending before Congress and which is ordinarily taken to be the basis of legislation on this subject. I refer to H. R. No. 6838, and presume that you will expect me to discuss the terms of this particular bill rather than to attempt an address along general lines. I beg to say, in passing, that it is vastly easier to present ideal results which you hope may flow from a measure of legislation than it is to construct the actual statute. It is likewise easier to present criticisms against a bill, to give way to the fear which is always present, than it is to suggest other provisions which will accomplish the desired result and avoid the evils complained of. I am fairly well acquainted with the literature on this subject and have read much of what has been said and written by many who pose as authority on this subject, without finding any helpful suggestions to those whose duty has been to frame this legislation.

We desire legislation which will be national in its character and which will go into operation under favorable conditions in all parts of the nation. It is especially desirable to secure as uniform a rate of interest as possible and to reduce that rate to as low a degree as the economic conditions of the nation will permit. It is likewise desirable to encourage farmers who are now in debt, to fund that debt in long time obligations on terms which are tantamount to a savings investment. It is the experience of the world that only those who are enabled to save a part of their daily income ever become financially independent. It is in this sense that policies in endowment life insurance and shares in building and loan societies give financial independence to their holders. We seek to extend these advantages to the farmers who are in debt for their farms or who desire to borrow money to improve them. Such results are only possible by an investment made under an organization, controlled by competent men, supervised by law, and in volume of business large enough to invest small savings to the best advantage. This suggests co-operation, as a business method. We seek to create a system which, when fully organized, will include farmers from every section and every neighborhood in the nation. In the aggregate, the volume of business will be very large; the cost of expert management will be correspondingly small. Thus the individual farmer, though his business will be comparatively insignificant, will be given every advantage of a stockholder in a large corporation, officered by experts. His mortgage which is ordinarily an extreme burden is changed into a long time lease on a tract of improved real estate which, through his labors, will yield sufficiently to pay him remunerative wages and to meet his liabilities, so that he will enjoy the benefits of proprietorship with a reasonable certainty of attaining a title in fee to his holdings.

These results require a national organization and national co-operation among American farmers. The very territorial size of our nation suggests many difficulties. The many different state laws as to land titles and the exemptions from debt makes the problem a difficult one. The independence of the American farmers, many of whom are in fact, real pioneer settlers, adds to the difficulties of framing a general statute which is applicable to all parts of our natural territory. It is but little wonder that we have spent more than two years in arriving at a satisfactory solution of this subject.

I am well aware that there is a wide spread interest in personal credit aside from mortgage credit. It is said, and truly too, that our landless tenants need especial assistance in the way of necessary credit. The bill under consideration deals only with mortgage credit; but before I begin a discussion of its terms and conditions, I beg to refer briefly to our new banking and currency law, commonly known as the Federal Reserve System. It is well known that farmers are charged high rates of interest in many sections of the United States on personal loans. The Comptroller of the Currency, Honorable John Skelton Williams, has publicly called attention to some of these usurious rates. He has given instances, taken from the actual bank records, which are nearly unbelievable. For instance, he mentions one case where a woman paid 120% interest on $110.00 which was borrowed to purchase a horse. Many individual loans are instanced where the rate of interest runs higher than 100%. I will not lengthen my address to repeat his examples. His address before the Kentucky Bankers' Association can be secured upon application to the clerk of the Commission on Rural Credits at Washington. It is well worth reading by any student of this subject. It naturally brings up the subject, "What influence has our new banking law had upon the situation so far as it affects loans to farmers for short periods of time?"

No student of the subject will admit that the present system is fully organized and has as yet exerted its full measure of benefit to the farmers. We have had, however, sufficient actual experience to know that without supplemental legislation, the system will not be able to help agriculture to the full measure of its possibilities. Every modern system of personal credit—rural or commercial—is based upon the power of the government to issue money or certificates of credit. The volume of money available under such a system is increased by the government rediscounting notes held by banks, or loans by the bank of issue to the borrower. Thus in times of stress both the volume of money and the rate of interest are controlled by the government bank of issue. It has been declared by the present Board that its policy will be to grant to agricultural paper—paper secured by warehouse receipts representing agricultural products—a preferencial rate of interest. The rate under present conditions, on this class of paper is three per cent. This rate is as low as any foreign government has ever given to its farm citizens. Last year, we grew nearly ment has ever given to its farm products. If these products had been properly classified and warehoused, this immense value would have been available as collateral security at this very low rate of interest; and these commodities were in actual ownership and control of our farmers. The Southern farmer was able to take a limited advantage of this rate because, under the law, the Department of Agriculture supervises the grading of his cotton. This is done under the Cotton Standard Act. Of course, it is but a beginning. Neither the banks nor the farmers fully understood the possibilities which lay before them. Then, too, the banks were afraid to encourage this low rate for fear of the effect it might have on their commercial business. There was, however, several million dollars of rediscounting done by the Federal Reserve Banks at the three per cent. rate. This business is sure to grow by leaps and bounds as education spreads among the planters of that section.

The same opportunity is open to the Northern farmer as soon as we can secure a law standardizing our farm products as cotton is standardized. I had the honor to introduce the Moss Grain Grades Act in the last Congress. It passed the House by practically a unanimous vote but failed in the Senate. I have reintroduced it in the present Congress and it is number 4646. Mr. Lever has introduced his Warehouse Bill. The bill also passed the House during the last Session but failed in the Senate. The Grain Grades Act authorizes the Secretary of Agriculture to fix uniform standards of quality and condition for all principal commercial grains and to supervise and enforce their application in the grading of all grain offered for sale. The Warehouse Act authorizes the Secretary of Agriculture to license and to bond warehouses open to all producers of farm products who may care to store them therein. The government will have supervision of all operations of warehousing, grading the products, and issuing the receipts. If these two bills were in force, any farmer in the Union could take his surplus farm products, have them graded according to government standards and store them in warehouses supervised and bonded by the United States. He could then take his receipts to the nearest bank and get a lower rate of interest than is given to any other class of paper. If farmers were to organize a co-operative bank, it would be entirely possible to secure money at three per cent. less only the overhead charges of operation. These two proposed laws must be enacted if we are to secure the full benefit of own new banking law. If farmers will organize and demand the passage of these measures, they will be enacted into law. It is the open door to cheap credit; it is a certain method of securing three per cent. money to finance our farming operations, and if we press forward along these lines, we will secure for ourselves as low rates on personal farm loans as any nation has ever granted to farmers for like purposes. Can we ask for greater results?

I have thus briefly referred to personal credits not only as an answer to the criticism that nothing is being attempted to improve present conditions, but also to call your attention to the very broad comprehensive legislation program which is before Congress at this very moment. I confidently assert that these three measures, the Grain Grades Act, the Warehouse Bill, and the Mortgage Credit plan, taken together, constitute the most important legislation affecting agricultural interests that has been introduced in Congress for a generation.

I have spoken briefly of the purpose of rural credits and some of the difficulties to be overcome in framing legislation to meet our conditions. The present bill, H. R. No. 6838, creates a national system of mortgage banks to be operated by a federation of farm borrowers, organized as a co-operative association. It also authorizes a separate system of mortgage banks, organized as corporations and controlled by private initiative. These two systems are separate and distinct; nowise antagonistic but everywhere competitive. In practically every other country of the world, mortgage banking has been successfully organized under each of these plans. They bear the same relation to each other as the mutual and old line insurance companies. The provisions of the bill do not give any special advantage to either plan but seek to permit their organization under the most favorable conditions. The entire system is put under the control of a Farm Loan Board, consisting of five persons appointed by the President and confirmed by the Senate. Not more than three members of this Board may be chosen from any one political party. The members are appointed for a term of ten years and are paid a salary of $10,000 per year. It is the purpose to secure high grade, competent men, giving them ample power under long tenure and freeing them from political control. This Board organizes the new banking system and when once in operation, exercises supreme control over its functions. This Board is given power to divide the United States into twelve banking districts and to organize a land bank in each one of these districts. It is the purpose of the bill, as the system grows, to increase the number of land banks, until ultimately it may be that there will be a land bank authorized for every state in the Union. The number twelve was chosen to correspond with the Federal Reserve system, but ample provision has been made for the organization of new districts, whenever, in the opinion of the farm Loan Board, such action is necessary. These land banks must each have a subscribed capital of at least $500,000 before they can begin doing business. This capital may be subscribed by individuals, corporations, municipalities, or the government of any State; but in case it is not subscribed through these sources, then the Government of the United States is obliged to make such subscriptions.

At this point we reach the moot question of government aid. From the very start I have been opposed, personally, to those extreme measures of government guarantee of the bonds or a direct loan to borrowers by the government. It is practically impossible, however, to found a co-operative system and put it into actual operation throughout the nation unless some good angel will advance the initial capital. If this capital is sought to be secured by the issuance of shares of stock, either the holders of these shares must forego dividends or else the system can never become purely mutual and thus grant loans to its members at the lowest possible rate of interest. We have no such spirit of altruism in this country as would make it reasonably certain that foundation capital could be secured from private sources without the pledge of dividends. Thus the only practical way of organizing the system is to ask the government of the United States to advance temporarily the foundation capital, to be returned out of the subscriptions to capital stock which will be made by the borrowers under the plan of the bill. I am glad to be able to say that this happy compromise has been accepted by those who framed this bill and I express the hope that it will be equally acceptable to every advocate of this legislation. This provision makes it possible to organize a co-operative system which is owned and controlled by the borrowers themselves and a system where all the net earnings go as dividends to the borrowers in proportion to the face of their loans, thus giving them service at actual net cost.

These land banks do not have the power to negotiate loans directly with the individual. It will be seen at once that a land district which may compromise several states is too large a district to be assigned to any one institution transacting a business which requires it to gain an accurate knowledge of the value of many widely separated tracts of real estate and become acquainted with the personal character of thousands of individual borrowers.

In order to extend this organization and bring it close to the homes and lives of the borrowers, the land bank is required to conduct its business through local loan associations which are to be organized by farm borrowers in every neighborhood of the nation. Ten or more persons may organize such an association, each member, however, owning land and desiring to become a borrower in the system. Every member of the local association must subscribe for stock in the local association equal to five per cent. of the face of his loan, and the local association must make an equal subscription to the capital stock of the land bank. Thus the capital of the land bank grows in proportion to its volume of business, always bearing the ratio of one to twenty, and except the original subscription of $500,000, all stock of the land bank is held by the local association in trust for their membership. Whenever a member pays off his loan the land bank pays back at par his subscription to the capital stock and cancels his shares. This act severs his membership in the local association so that none but borrowers can belong to the organization. All voting power is held by the members of the local association. Thus the whole system is democratic and is controlled by the men who are acually borrowing money from the land bank. The local association passes upon the character of the borrower when he applies for membership in the association, and through its loan committee, makes an appraisal of the land which is offered as a basis for his mortgage loan. This appraisal and recommendation from the local association is forwarded to the land bank together with an application for the loan. The land bank sends an appraiser to re-appraise the land. The appraiser is an officer of the government and his salary is paid by the land bank. The report of this appraiser fixes the value of the land as a security for a mortgage loan which cannot exceed 60% of the appraised value. The land bank sends the money to the association and the association pays it over to the borrower. Likewise the borrower makes his several payments to the local association which forwards the money thus paid to the land bank.

The local association is but an agent acting for the land bank to secure accurate and intimate knowledge of the land values and personal character. Each borrower insures his own loan to the extent of five per cent. of the amount of the loan. We have every element of safety; local knowledge, mutual liability, and self interest. The land bank, as the mortgages accumulate, deposits them in amounts not less than $50,000 with an officer of the Farm Loan Board called the registrar. These mortgages are held in trust by the registrar as special security against an issue of bonds. The Farm Loan Board causes an appraisal to be made of these mortgages and issues permission to the land bank to issue bonds. There must always be an amount of unpaid mortgages on deposit with the registrar equal to the par value of bonds outstanding; and as mortgages are paid off, either in whole or in part, these sums must be reinvested in farm mortgages, or farm loan bonds must be purchased in like amounts and cancelled.

The success of any mortgage system must depend upon the ready sale of bonds. Not only are the loanable funds secured by the sale of bonds, but the rate of interest on farm mortgages is fixed by the rate of interest on the bonds. The whole system of mortgage banking is devised to enable the farmers of the nation to pool their assets, and by issuing bonds, to borrow money at low rates of interest. A successful system will thus not only secure money for farm borrowers, but it will develop a safe investment for the surplus earnings of the nation. It seeks to cause money held for investment to flow towards the farms and thereby develop a mutual financial relationship between industrial centers and agricultural territory. This requires an attractive credit instrument. Every bond issued by a land bank is freed from all forms of national and local taxation; it is secured by a first mortgage on improved real estate which is worth at least twice as much as the face of the bond. It is further secured by the capital stock of all the local associations in that land district. It is also secured by the capital stock and reserves of the land bank which issued it; and finally it is secured by the assets of every other federal land bank in the United States. The value of such a bond cannot be doubted. As long as the rains fall and the sun shines, as long as the promise of a seed time and a harvest continues, and so long as man must derive his food and clothing from the soil, such a bond will stand as the safest investment on earth.

The land bank is permitted to charge borrowers one per cent. higher rate on mortgage than the bank pays on its bonds. This represents the income of the bank out of which expenses are to be paid, reserves builded, and dividends declared. It may be in actual practice that this margin will prove to be too high and will be much reduced. This point is not of much importance one way or the other. If the income of the bank is greater, the dividends paid to the borrower will be higher, because all surplus earnings must be distributed to the borrowers. Loans are made for only certain purposes, within certain specified amounts, and for certain periods of time. These limitations are written in the bill in order to kill speculation.

The United States has not as yet passed through its speculative period. In some sections of this country the value of land is rising faster than the legal rate of interest. It is not the purpose of this bill to help the speculator, but to assist the farmer to own an average sized farm and to improve and equip the same for productive agricultural purposes. Therefore, loans are denied to any one who will not actually cultivate the land he proposes to mortgage, and who does not desire to use the money either to purchase a farm home, to improve his land, to purchase live stock or to cultivate it. No person is granted a loan less than one hundred dollars or more than $10,000. It is believed that these restrictions will not work actual hardship on the great mass of farmers who will apply for loans; and on the other hand that they will prove an effectual bar to speculation. Thus the whole benefits of the bill will go towards the development of our agriculture, to the building of new farm homes, and to the founding of better flocks and herds. Loans are made for a period of not less than five nor more than thirty-five years. These loans are made re-payable in fixed semi-annual installments so that all payments are of equal size and include both interest and principal.

This method of repayment is known as amortization. The reduction in the debt is computed according to the principles of compound interest, so that the borrower not only reduces his debt in the amount which he actually applies on the principal, but he also receives interest upon interest. He is given every advantage of an investment in a savings institution which is officered by competent and skilled financiers. It will thus be possible under the provisions of this bill to borrow money on mortgage security and repay it, principal and interest, at a lower rate than farmers even in the most favored circumstances are now being charged interest alone. To illustrate this: When I was in Europe, farmers were repaying their loans at an actual rate of 4.85 per cent., which rate of payment included interest, principal and administrative charges. This rate, at the expiration of the period extinguished the debt. I will now make a confident prediction that when this law goes into effect, and becomes fully established, that the farmers of Pennsylvania will be able to borrow money under its provisions at a rate of five per cent. which will extinguish interest and period within the period of thirty-five years. The loans granted are unrecalled by the bank and need never be renewed and cannot be foreclosed if the contract payments are made. The borrower, however, is given the right to pay off his loan in whole or in part at any interest period. Thus, no borrower need be afraid to contract for a long period of time because he can anticipate payment at the close of any six months periods. This works no hardship upon the bank because it can either loan the money to some other farmer, or can sell in its bonds and pay them off.

I have noticed recently in the public press certain prominent individuals, one of them a president of a life insurance company, attacking the amortization feature of the bill and claiming that the American farmer does not desire the privilege of long time loans. This is but an indirect and insiduous attack upon all methods of rural credit loans. The very strength of the system lies in the fact that the farmer is given an unrecallable contract running over a long period of time, reducible according to the earning power of compound interest, and in individual payments small enough that they can be met out of a moderate share of the farmer's income. He thus escapes the slavery of debt; he avoids imposing privations upon his family; he is enabled to live, to educate his family and to pay for his farm. He is thus a home builder during the period in which he becomes a home owner. The man who seeks to destroy the amortization feature upon mortgages or to discourage legislation authorizing it, has no right to pose as the friend of the farmer or to speak for the progressive element in American farm life.

I have given the main outline of the co-operative features of this bill; however, I have not mentioned the principle of unlimited liability. There are two classes of loan associations authorized in the bill, one with limited, the other with unlimited liability. Just as the bill does not favor unduly either the mutual or the corporate plan of mortgage banking, but seeks to permit either to be organized under the most favorable conditions, so does it give preference to neither limited nor unlimited societies. It permits either to be organized under conditions most favorable to their success. It is my opinion that the loans will be made under one form just as cheaply as they will be under the other. There has been much criticism and I may say loose talk indulged in discussing the principle of unlimited liability. As that principle is applied under the terms of this bill, I do not believe that the individual farmer who may join such an association would incur any greater actual hazard than though he were holding a membership in an association with limited liability. I am aware that he assumes a greater legal or technical liability, or you may put it, a greater contingent liability; but safeguarded as it is, his full contingent liability can never develop into an actual liability which he will be called upon to measure in dollars and cents.

Certain criticisms have been made because the stockholders in the limited associations incur a credit liability equal to five per cent. of the face of ther loans. Such critics may pose as the friends of the farmer, and may actually succeed in persuading some farmers to accept them as such; but the fact is that this is a business association; it is neither altruistic nor charitable. Co-operation, as a principle, seeks only to benefit its own members; it has no regard for the interest of non-members. It seeks to enable its own members to save; to transform savings into foundation capital; and through the earning power of capital, to give them financial independence. The members who own a co-operative association secure all the earnings of that association and in terms must assume all the risk of the business. The experience of the world is that under a well managed, honestly conducted and thoroughly supervised system of mortgage loans, there are no appreciable losses. And where there are no appreciable losses, there can be no large contingent liability. It is the exercise of good common sense for an association of borrowers who seek to secure money at low rates, upon favorable terms, to offer a security against which there can be no possible doubt. This is the only reason that capital stock is required and that credit capital is assembled. The five per cent. which the farmer subscribes to the capital of the land bank is not the money which is loaned out to his neighbor, but is a fund which is held as a guarantee and is invested in safe and attractive securities. The income upon it is sent back to the owners in the shape of annual or semi-annual dividends.

The only instance where this fund can be drawn upon by the bank is where some borrower defaults in his obligation and the association is unable to collect his obligation at law. In such an instance, the loss would first fall on the individuals and then would be distributed equitably among his associates in business. The person who seeks to encourage farmers to go into an organization whereby they are supposed to gain all the rewards and some other man shall pay all the losses, is either dishonest with himself or is trying to deceive his followers. It is an apt case where the blind is attempting to lead the blind.

GOVERNOR BRUMBAUGH: I think you will join with me in expressing our sincere thanks to Mr. Moss for this very interesting, informing and lucid address. If that is the type of men they are bringing up in Indiana on the farms, we had better look to our seed in Pennsylvania. It is a real pleasure, Sir, to have had you here, and on behalf of this great body of representative citizens, I thank you again and again. Is there any further business before the body tonight? If there is nothing more, the meeting stands adjourned.

January 27, 1916, 9 A. M.

Vice President Fenstermacher in the Chair.

The CHAIRMAN: The meeting will please come to order. We have this morning reports of Standing Committees and Specialists, continued, and first on the program is the report of the Ornithologist, Dr. Joseph Kalbfus, of Harrisburg.

DR. KALBFUS: I do not know why I was selected as Ornithologist; but I am going to make a slight report on the value of birds and the failure of the farmers to do what they ought to do for the birds. Then I am going to touch for a minute on predatory birds and insist that there are lots of such birds all around us that were not raised in nests or tree tops and never wore feathers.

I listened to an address last night on how the farmer is to proceed, how he has got to put his corn in and get money on it and all that. But he has first got to raise the corn, he has first got to get a crop, and the subject I am going to talk about, through which I believe that the man engaged in it is injured and bled to a greater extent that anything on the farm, and that in the dairy business you can raise your cattle, have your buildings and give them all the care you please, and when the time comes, you come to the creamery or some place else and your profit is all taken. It is foolish for us to sit here and talk about it and then do nothing. I am interested in a farm up in Bradford county that came to me through inheritance—my wife's part owner; it is my unfortunate problem to run it. I get about 2½ cents for the cream that is found on a quart of milk. I get the skim milk back sometimes, sometimes some other fellow gets it, and it is not fair to the producer and there is no use to beat around the bush; you are here to do something to better conditions, to better your own condition and to better the farmers' conditions in this State, and the sooner we consider these things, the better it will be for all of us.

My article here is entitled, "Who is neighbor to the birds?" It is well enough for the farmers to talk about what they are doing for the birds, but when you come right down to the proposition of what you have really done, it is nothing. The fact that a farmer permits a covey of quail to feed on his land, that is, that he don't chase them off, is one thing, but to do something for them in the time of need is another thing. Our quail in this State are almost gone. I have been trying in the past number of months to secure quail from Mexico. I sent an agent to Mexico at the expense of the sportsmen; I expected to have introduced in the State at least ten or twelve thousand or more quail; day before yesterday I got a wire from Washington stopping the shipment of quail because they had a disease called Coxidosis, that is extremely contagious and almost always fatal. I had one importation of about 175 come in to New York about four weeks ago; there's 16 of them alive to-day. I had another importation that came in three days ago, and 77 of those died the first day. The intestines are covered with ulcers and the liver with white bloches that is infectious to the extreme with quail. It does not apparently affect other birds, and the time has come, as I said in my last report to the Commission, that if we are going to preserve the quail, there must be a closed season, and that does not mean simply that the farmers are going to go along as they have done; the farmers are the ones that are really interested, and I am going to touch on this subject in this paper.

I am going to just stop a minute to say that it is not the quantity of birds we have; it is the variety of birds, each doing a work for the farmer in its special place, in its own peculiar way that the other birds cannot do, something that means something to every one of us. The wren, the robin, the different birds doing their own work; the robin in the Springtime taking insects and the larvae of insects chilled in the furrow, doing something that saves the farmer incalculable cost. Yet the minute the cherries begin to turn or his berries begin to get ripe and the robin comes to get a little something, he is out to soak him. The laborer, being worthy of his hire, ought to be considered with reference to the bird. I know it is aggravating to have your strawberries or cherries picked, but the robin is doing something for you in his place that, if he did not do it, no other bird would.

REPORT OF THE ORNITHOLOGIST

By DR. JOSEPH KALBFUS

Who is Neighbor to the Birds?

For many years those who have investigated and understood the value of the lifework of birds have been striving to have the people around them understand this matter as it should be understood. Through pamphlets, illustrated lectures, and in various other ways, this matter has been persistently called to the attention of our people, so that the value in dollars and cents that comes through the presence of this or that species of birds is so well understood that I need not dwell upon it at this time. The great majority of birds are our friends, the value of the lifework of this family or that species is undoubted, each in its own place is doing something for us, especially for the farmer, the value of which cannot be expressed in words or figures.

Experience teaches that a little kindness, either in word or deed, has its effect upon wild animals and birds, just as it has with human beings or with domestic creatures. Without this kindly attention the birds are apt to drift or be driven from us, to our great disadvantage. What have we done, either to attract these feathered friends or to keep them with us? The fact that I may permit a covey of quail or a flock of other birds to feed upon my premises, or at least to not drive them away, is not feeding the birds; they have done me more good than I have done them; they have at least cost me nothing, and I am afraid that many of us are not doing for the birds what we should do, and I only wish I had the power to say or do something that would cause the farmers of this State to realize the true position they occupy regarding this subject. When the farmer, the farmer's wife, his sons and his daughters, do for the birds what they can and should do, then, indeed, can it be said for the birds, "The winter is over and gone and the voice of the turtle is heard in the land."

I know the many turns the farmer and his family are required to make each day; I know how all his time is taken, and when I say that but a few farmers do anything for the birds around them, I intend to make only a plain unvarnished statement of fact, and not to be offensive. I happen to have spent some considerable part of my life in the country, and say what I do after a careful canvass of the question extending through a serious of at least forty years. To my mind, the farmer has not been neighbor to the birds; I know of but few farmers who, unless they were also sportsmen, have ever done one thing to attract the birds, either game or otherwise. Upon the other hand, they have done much to injure and drive the birds away, and how have they done this? The old tree filled with woodpecker holes in which the hairy and downy woodpecker and the chickadee and the nuthatch found winter homes, and in which the bluebird and many other early Spring migrants found shelter from cold and sleet, have been long since transferred to the farmer's wood-pile, and have gone up in smoke through his chimney. Through the practice of tree surgery, the trees in the orchard or on the lawn have all had the decayed places cut away, and the cavities filled with cement, so that the birds before named have no place into which they can retreat in time of need. They, therefore, freeze and die, and the farmer, if he pays any attention at all to the subject, wonders what has become of the birds, and I wonder how many farmers in the State have attempted to put up bird-houses to take the places of the shelters destroyed. I wonder mow many farmers in the State have hung out suet, or fresh meat, or other food for the winter birds in the time of necessity. How many of your farmer friends, unless they were also sportsmen, have ever traveled through storm and sleet to find and feed a covey of starving quail, as many sportsmen have done, or who have ever put up good hard-earned dollars as many sportsmen have done for years, to buy quail in other states and place them in this State.

An undoubted friend of our birds, Dr. William T. Hornaday, one of the great naturalists of the world, and Director of the New York Zoological Park, in writing upon this subject, among other things, says: "Show me one farmer, or forester, who goes out of his way and labors and spends money to protect his feathered friends and I will show you ninety-nine who never lift one finger or spend one penny a year in such work." And again, "If there was anything I could say that would penetrate the farmer's armor of indifference, and sting him into activity on this subject, I would quickly insert the stinger, even at my own cost and loss." And, again, "Did you ever know a real sure-enough farmer to subscribe to a fund for game protection or to spend time and money in attending legislative hearings in behalf of bird protection and increase? I never did; I mean the real farmers who depend upon their crops for their bread and butter."

Dr. Hornaday was born and raised on a farm in Iowa. He knows something about the disposition of farmers; he knows that because of their many and varied duties the majority of farmers have no time to even think of the birds; his whole life has been spent in a battle for the birds. He has come before the legislative bodies of many states in the interest of birds, and it would not do for him to tell anything but the truth about farmers. He knows there is not one farmer in fifty who can tell the names of half the birds around him, or who knows of the special work each species of birds is doing for him. Dr. Hornaday would hardly attempt to "slur" himself or his people, or to "joke" regarding one of the most serious questions he has been called to consider in his lifetime, and the sooner the farmer realizes his true position the better it will be for him, and for the birds. Don't, I beg of you, get cross at me because I dare to tell you the truth regarding this matter.

Someone will assert that birds were more plentiful years ago, when no one even thought of the birds, than they are at this time. This is no doubt true, but if that person will investigate they will find that in the days when birds and game and predatory creatures were plentiful, men were scarce, and had not taken the homes of these wild creatures as they have today. In those days the wild creatures had plenty of land on which to roam, and untold numbers of hiding places; their feeding grounds were without limitations. Today, in highly cultivated sections, the majority of our birds are compelled to nest upon the ground or upon low bushes, within easy reach of their many natural enemies, to the great discomfort of the birds. The farmer's cat, his dog, his reaper, his mower and horse-rake, each one get in their deadly work; his cows, his horses and sheep tramp out the nest in the pasture; forest fires, built by human hands, take their toll, especially Spring fires, that not only destroy the nests of birds, but also the young of the birds and animals, and in addition destroy the trees and vines and shrubs that furnish the food for all wild creatures, when insects are gone. The swamp has been drained, wherein the covey of quail or other birds were wont to take refuge at eventide on a tussock, safe from prowling enemies. The farmer's cat, it is estimated, kills at least sixty song birds every season, more birds than are killed by any five hundred hunters in the State, excepting boys, for true sportsmen never kill song birds. Crows are permitted to hatch and increase everywhere. The farmer never thinks of the crow, except when he is pulling corn, and for destroying birds the crow beats the cat out of sight. Young crows, in the nest, are said to consume daily animal food equal to two or three times their own weight, and the eggs and young of birds are taken by crows whenever found. This disposition of the crow is what drives many birds to seek nesting places near human habitations, and causes the robin to build on your window sill. And the great wonder to me is, not that we have so few birds, but, instead, that we have birds at all.

In Wyoming last winter, and for several winters past, the utmost effort of the United States Government has been put forth to save the lives of thousands of elk dying from starvation, because settlers had taken their winter feeding grounds for farms. Elk were plentiful there, for no man knows how long, and none starved; today they must die because their winter feeding grounds have been appropriated to the use of men, just as the homes of our wild creatures of various kinds have been taken here, and still we wonder why the birds have decreased.

This much for the birds that are useful, now just a word about certain other birds.

In my paper read at the time of our last meeting, under the title "Predatory Birds," I attempted to call to the attention of farmers to the fact that all birds as I know them were not raised in nests in the tree-tops, neither were they covered with feathers. Aristotle, in the long ago, in describing man, said he was a biped without feathers, indicating to my mind that even in his day there were birds of various kinds and that old philosopher had been up against some of them. In my last paper, I attempted to call attention to the fact that in my opinion a matter of very grave importance was the manner and the channel through which the products of his farm reached the market. I especially called attention to the method of testing milk in creameries for butter-fats, and the unfair manner in which the skim milk was returned to the one who produced the milk. Since our last meeting, I have examined into this matter to a further extent, and believe that nothing that can be done by the dairyman on his farm will overcome the leakage and loss at the creamery. I am satisfied that a real bird of prey, in so far as the dairy is concerned, is perched on the lentel of many of the creameries operating in this State, and it makes no difference whether the loss be brought about through negligence or carelessness, or with malice aforethought upon the part of the creamery employees or owners, the loss to the dairyman is just the same, and the reason why the check is short, if it is short of what it should be, means nothing to him. Three-tenths of a point off the correct test to the ordinary farmer takes the greatest part of his profit, and five-tenths takes it all, and as I understand it, it is extremely easy under the system of today, to lose his profit in just this way.

These conditions are so evident to any one who chooses to investigate from the standpoint of the producer, that in several states steps have been taken to overcome these wrongs, and official examinaers are provided for by law, and it is made the duty of such official to visit frequently at unexpected times, every creamery in his district, to take samples of the acid used and of milk from dairymen, and to make tests under varying conditions, so that as nearly fair and just conclusions can be reached as may be possible.

Why should this not be done in Pennsylvania? What is the benefit to anyone in keeping clean stables, with cattle up to the standard every time, only to be robbed later on by the middleman? It seems to me this is a matter well worthy of serious consideration, and that some plan through which these wrongs may be corrected should be conceived and put in operation as quickly as possible. To my mind, the farmer alone is the man to do this, men who understand existing conditions and what is necessary to correct those conditions. The profitable work of "farming" farmers has grown to be quite an industry, and if this task is entrusted to men other than practical men in this line of work, there is no telling what the result may be. Have you ever considered that of the many laws upon our statutes today supposedly conceived by farmers and passed at their instance and in their interests, there are but few that in reality help the farmer as much as they help the other fellow, and not one that even pretends to protect the dairyman. Farmers, as a class, are not perhaps, because of their secluded life, as fully in touch with and as wise to all worldly ways, as are some others. Some farmers I will admit are fairly well halter-broken in this direction, and have earned the method of selling a horse "that will stand without hitching," but the majority need and deserve to be told the truth and the whole truth every time; they deserve to have thrown around them every protection accorded other men. Let the Legislative Committee of this organization think this matter over.

WEATHER OBSERVATIONS

By PROF. W. G. OWENS

We seldom realize that we are living at the bottom of a great ocean of air. How high it is, that is how deep this ocean is, no one knows. Various methods have been used to measure its depths but the best leaves large chance for conjecture. The length of twilight has been used as the basis for this calculation, on the supposition that twilight is caused by the reflection of sunlight on the dust particles in the higher atmosphere. The height at which meteors become visible has also been used as a basis of calculation. This height can easily be determined by two astronomers who decide to measure the angular height of all the meteors which pass between them. If they each see a meteor at exactly the same time moving in a certain direction, it is likely to be the same meteor. Then knowing the distance between the stations, it is easy to calculate the height above the earth when first seen. But through how many miles of air has the meteor travelled before the friction made it hot enough to glow? That no one can tell. From one to two hundred miles may be put down as the depth of this ocean of air. Yet one-half of its bulk is within three and one half miles of the sea level. That is why the air is so rare on a mountain top that exertion brings on speedy exhaustion.

The air is so mobile that only when it or we are in motion do we notice its presence. It is so evenly distributed that we do not realize that it has any weight. When Torricelli first advanced the theory that air had weight, the idea was laughed at as being the height of absurdity, and his friends feared that he was losing his mind. They thought it absurd to suppose that the weight of the air could force the water up a pump stock, but that the water followed the valve because "Nature abhors a vacuum" was perfectly good logic. Even the great Pascal seems to have had grave doubts that the air had weight, but he realized that the fact could be proved or disproved by taking a tube closed at the upper end, filling it with mercury and placing the lower end in a cup of mercury. This instrument he had carried to the top of a mountain near Paris. As the instrument was carried up, the mercury descended in the top as it was brought down the mercury went up again. This Pascal concluded could only be caused by the weight of the atmosphere pressing on the mercury in the cup. Since the date of this experiment it has been acknowledged that the air has weight, hence must cause things which are immersed in it to become lighter by the weight of the air displaced.

The fact that the air has weight enables it to carry water in the form of mist and cloud and invisible vapor. It makes rain and snow possible and causes moisture to be carried to almost all parts of the earth. The only places where there is no rain are such localities as are deprived of it by local conditions. Deserts are generally due to mountains which rob the winds of their moisture as they pass over them.

No one factor has more to do with the prosperity of the farmer than the atmosphere unless it be sunshine. What causes the changes in the atmosphere? Why do we have rain today and sunshine tomorrow? Why is one summer wet, as the one which has just passed, and another dry? What makes these changes? These questions have come into the minds of men since the earliest times and yet they are still waiting for an answer.

In order the more thoroughly to study and understand the phenomena connected with the atmosphere, weather records have been kept for many years. At first by a few men now by many in all parts of the world. There is no part of the earth today in which the wind currents, storm and weather changes are not recorded and kept so that they can be compared and if possible a science created by studying these isolated facts.

In the United States there are about 200 meteorological stations with paid observers and the best instruments that science can furnish. Observations are taken several times a day and many of the instruments are self-recording so that a continuous record is kept. More than three thousand (3,000) voluntary observers every day make a careful record of the weather, and at the end of the month send it to the Weather Bureau. Here the records are compiled and classified and kept for future study. This work is duplicated the world over. All this is done so that by studying these data man may be able some day to learn the laws which govern the weather and be able to foretell the weather just as an eclipse of the sun or moon can now be foretold.

A beginning has been made. We know many points about the trade winds; the nature and force of monsoons, land and sea breezes, and many other phenomena have been worked out until they are fairly well understood.

Four great storm centers have been established. One in the West Indies and extending along the eastern coast of the United States. A record in the Philippine Islands and reaching into the China Sea. A third in Samoa and the Fiji Islands and the fourth at Mauritius.

Again we have learned that the wind does not move in the direction that the storm is moving but moves in an arch. In the northern hemisphere counter-plot-wise or from right over to left, while in the southern hemisphere it rotates in the direction that the hands of a clock move. By noting the direction and change in the way the wind is blowing, it is possible to tell on which side the storm center is passing. This fact is used by sailors to keep out of the storm center.

Some stations make observations in the higher atmosphere. Sometimes kites are sent up which carry self-recording instruments. These determine temperature, pressure, wind and humidity. Sometimes the kites have steel wires to hold them so that they can go up about a mile. At other stations small baloons carrying instruments are sent up. These have been known to reach an altitude of 15 miles, which is more than twice as high as man has ever been. These instruments are marked so that anyone finding them will send them through the post office to the sending station. While many of these are never heard from yet many come back and tell their tale of adventure far above the clouds.

These inquiries in the upper air have revealed many peculiarities which were not suspected. Most of these, of course, will be of more value to the aviator than to the farmer, but they may result in our learning what causes rain and changes in the weather, as well as wind and frost. When these observations are used in connection with the weather records, they may enable some master mind to outline the laws which govern the weather.

A beginning has already been made. The storm centers which begin between the Equator and 25 or 35 degrees north latitude move west, then north, then northeast with increasing velocity till they reach about 65 north latitude when they generally have spent their force. Little is known of the storms in the Artic Zone. The storms that affect us most originate around Lake Superior and move down the St. Lawrence and spend their force in the interior of Russia. The great whirls which are called general storms are supposed to be caused by polar and equatorial currents. They cover large areas, move slowly and take many days to develop. Small storms called tornados or cyclones, sometimes causing waterspouts generally visit limited areas and sometimes do great damage. From what has been sail it is seen that many people are working on the weather problem. Predictions are sent out by the Weather Bureau forecasting the weather for 24 or 48 hours. These are every year becoming more accurate. Yet in certain localities they often fail. This may be due to local conditions which the farmer might, by observation, be able to determine and so by the help of the Weather Bureau's forecast be able to predict the changes which were likely to follow.

REPORT OF APIARIST

By PROF. H. C. KLINGER

The year just past has been a failure in the production of honey in this State, and almost the same throughout the whole country. Everywhere there seemed to be a profusion of flowers during the season, but the wet and cool weather prevented the secretion of nectar. The timely help of the Asters late in the Fall in some of the sections of the State saved the expense of buying sugar for Winter feeding. Where these flowers did not exist, colonies had to be fed to keep them from staravtion. This is the second year of failure in succession, but the average bee-keeper is always hopeful and already sees indications of a good crop in 1916. The wet Summer started an abundance of clover, and the moderate Winter weather which already gave two flights to the bees both point to a successful Summer.

At present there is possibly no subject so absorbing and perhaps alarming to the apiarist as the bee diseases now so prevalent and virulent in the State—that of American and European Foul Brood. Notwithstanding the fact that the State inspectors have been waging war against the spread of the diseases, the scope of their work is so large that it will require several years before the State is under entire control.

Thousands of colonies have been inspected during the year, and in a number of counties where the disease was not known a year ago, hundreds of colonies in as many apiaries were found infected and many in a hopeless, rotten condition. Under present conditions no one can feel safe that one or the other form of disease will not make its appearance any time during the season.

The European type is know to have spread over a distance of more than 50 miles in a single season. It is absolutely important that every bee-keeper becomes informed with all available knowledge pertaining to the subject and stands ready to combat the disease on its approach. As in the fight against the San José scale that infected the fruit trees, those who were willing to be guided by knowledge and led by instruction came out of it with healthy trees and fine wholesome fruit; and it seemed that their trouble was a blessing in disguise; so we hope out of the fight against these diseases we may come with better bees and apiaries, greater efficiency and larger profits. Of the two diseases, the American type is perhaps the most difficult to treat; yet the European is the most to be dreaded on account of its rapid spreading in an apiary, and then into neighboring apiaries and surrounding centers of infection, and the rapid decimation of a colony attacked.

The causes of the spread of the diseases may be summed up in two words: Ignorance and carelessness; not ignorant stupidity, but a lack of knowledge of the form and manner of the diseases. Many persons think their bees died from starvation, "froze to death," or the "worms killed them," when, if the facts were known, it would have been found they died from infection of one of the brood diseases.

The means of dissemination are several: The shipping of bees, or moving them from one place to another; the sending of queens in cages which contain food mixed with infected honey; and often honey cans, section boxes and other containers are thrown in garbage places where bees will find the infected honey and carry it back to the hives. Undoubtedly the most serious way of infection is that of robbing out a weakened colony. Sometimes a quiet robbing takes place that only an experienced person will detect. It is a question much under discussion at the present that the European type, on account of its rapidity in spreading, is carried by the bees on their bodies to the fields, and flowers and other bees coming in contact with the same flower may carry the germs back to other colonies in the same or other apiaries. This is thought probable also from the fact that diseased larvae from the American type are never touched by the bees, while under favorable conditions they will clean out the diseased larvae of the European type. So that in trying to rid their own colony of the infection they may throw the germs outside of their own hives or carry them to the fields.

For curing the disease there are several methods given in journals, State bulletins, and by the inspectors. It would lengthen this report to go into details. One fact has been confirmed by all authorities: That black bees more readily succumb to the disease than do the Italians; and, also, where vigorous Italian queens have been introduced into infected colonies a permanent cure has been effected without any further operation.

Morley Pettit, the Provincial Inspector of Ontario, Canada, says, "The cure for American Foul Brood is only permanent when pure bred Italian queens are introduced by all black or hybrid stocks." "Pure bred Italian bees of vigorous stock are almost immune to European Foul Brood."

If the State expenditure shall be of the utmost benefit, it is of the greatest importance that the State receive the co-operation of every man whose interests are touched. The remedy for foul-brood is in harmony with the best system of bee-keeping that must be followed in order to obtain the greatest success, even if there were no diseases. "Keep bees better and keep better bees."

REPORT OF THE AGRICULTURAL GEOLOGIST

By MR. W. H. STOUT

Obedient to a summons to appear here at this time to give an account of my stewardship since we met last, I present some thoughts on a topic which may not contain anything of interest or value.

There is this consolation in the knowledge that it costs each one only about fifteen minutes, or less time than is often consumed waiting for a car or for desert at the dinner table. Also some of those present on the State's pay roll receiving one to four cents a minute while here can rest in contentment, and others can rest, digest and assimilate the meals for which the State pays. Differing mentally and physically, we do not see things in the same light or from the same point of view; so if none agree with the sentiment in the following discussion is only proof that majority may be wrong and the minority right.

There are no two things exactly alike in nature, in the vegetable or animal creation, the human race being no exception. A very prominent orator, statesman, politician, peace propagandist, editor and agriculturist related this story during a political campaign: "A farmer hurrying a load of hay from a field before an approaching storm, had part of the load slip off which was reloaded, another start made and after going a short distance, more dropped off, which was replaced. All went well until in turning to enter the barn nearly half the load upset, while the storm was almost overhead. The farmer's beloved wife came to offer assistance while he was in ill humor, and overheated, tugging at big forkfulls to get it in the barn, the wife anxious to help asked, "Can I do anything to help you?" to which the husband replied, "No, dear, you cannot, go in the house, I am going to express myself." So I am going to express myself in mild language and plain terms on the subject of agricultural geology, and history reviewed, with emphasis on *reviewed*, which I tried to confine to fifteen minutes, without exceeding the speed limit.

Spragging the Wheels

At the coal mines, to prevent the mine cars without brakes from running wild, use is made of tough, round clubs, pushed between the felloes to check the speed and stop the cars where wanted. The time is here when there is danger of the agricultural cars overloaded with mushroom agriculturists and theorists on a down grade, to throw some clubs on the track and in the wheels, to avoid the danger of going over a precipice or into the breakers, with the Juggernaut crushing the taxpayers under the wheels.

AGRICULTURAL GEOLOGY AND HISTORY REVIEWED

After spending much time and thought during many years reading theories and following the field workers and so-called scientists over much of this and other countries, striving to prove that the soil contains such vast stores of plant food elements that many generations can maintain themselves on the elements inherent in the soil. Virgin soils always contain more or less available plant food in proportion to its derivation, yet there is none inexhaustible although it may yield for considerable periods remunerative crops; it will eventually cease to produce paying crops. The alluvial lands—periodically overflowed—those derived from limestone and chalk with that from volcanic activities are most valuable, while the rocky, sandy, shaly or those consisting of very fine silt and tenacious clays are neither so lasting and more expensive to maintain.

The early settlers already knew the best soils, selecting such as were heavily timbered or along alluvial bottom lands where, with little effort, large crops could be cheaply produced for export such as cereals for milling as well as for distillation. Whenever land owners found the soil under cultivation less productive than it was originally, the heavily timbered hardwood forests were cleared and wastefully destroyed, or used up in building houses and barns with the choicest timber that would now be worth fortunes. The great barns and other buildings on the farms in the most productive sections testify the wealth taken from the land during the period when the farmers were capitalists loaning money, donating land for canals and railroads and investing in stocks and bonds which was often the last seen of their money, because of reorganization and receiverships.

It is also to be observed that in many parts of Pennsylvania, from the Delaware to the Potomac rivers, the valuable estates and fertile farms are now in the hands of absentee landlords, residing in towns and cities, engaged in some business that affords enough means to support the farms, display their wealth and their ignorance about agriculture, appealing to the State for the aid of rural uplifters, extension agents and specialists to help them make a big showing in the magazines and the press in general.

Under the system of finance, government and political rule, it seldom happens that actual farmers acquire means to purchase additional land, while those engaged in commerce, banking, law or in politics—provided the latter can stick to an office for terms of ten to twenty years, at salaries ranging from three to six thousand dollars, drawing on public funds to the extent of sixty to eighty thousand dollars—can invest in country estates and live retired as prominent agriculturists. Tenantry is on the increase; real farmers becoming tenants or driven into less productive sections where land is cheap to eke out an existence under adverse conditions.

Thus modern history is only repeating ancient history when the so-called nobility, or in plain terms the criminal cunning gained control of wealth created by labor, resulting in the decline of all the ancient governments being reduced to absolute proverty through exhausting the soil and the maintenance of an aristocracy, with immense military force to overawe their subjects. It is possible to postpone the inevitable with modern methods in the discovery of mineral fertilizers and earlier wastes, but it is questionable how long the supplies of moderate priced artificial fertilizers can be obtained to supply the quantity necessary to restore what is removed with crops. Chemistry may possibly come to relieve the future by combining the elements abundant in nature by preparing capsules of protein, carbohydrates and fats in condensed form to sustain future generations of inhabitants in countless numbers a century hence. The only salvation for farmers, as well as the general public, at this time is the use of commercial fertilizers and chemicals, regardless of what some would-be advisors, who sometimes ridicule its use may say. The honest fertilizer manufacturer who supplies the trade at reasonable prices, with honest goods deserves the respect of the people.

After spending many hours studying over the subject of agricultural geology, reading text-books and following the soil survey in its ramifications over states and nation, my conviction is that the public fund expended is just so much money wasted for all it accomplishes. The advice is the same and may be stated in one short sentence: Use manure, lime, chemicals, cowpeas, soy beans, crimson clover, alfalfa, rye, etc., with green manure for humus, then irrigate or tile drain, as the conditions suggest.

It is doubtful whether any practical farmer who is established in a location, on such soil as may make up his farm, ever derived any benefit whatever from all the vast literature and maps published and the great amount of money spent in soil surveys and soil analysis. The mechanical condition of a soil is of greatest importance, when of a consistency to hold moisture and fertility the other elements can be supplied, while other soils may show a larger amount of mineral elements by chemical test when in an unavailable state are entirely useless in practice. It has been demonstrated in England and our State that chemical fertilizers can be relied upon to produce crops equal to that of manure, resolving itself into a question of economics. Where manure can be obtained for nothing or at low cost, it is advisable to take advantage of the opportunity. Not so much for its plant food value as for the humus or carbonaceous matter contained to ameliorate the soil and hold moisture when that is lacking.

As for the soil analyses which may show tons of the elements needed by plants, it is not safe to depend upon it. Crops are the best guide that every farmer has at his command; so that by simply observing and a little experimenting is of more value than all the fine spun theories advanced by so-called experts. At small expense a small quantity of hydrochloric acid of ammonia with red and blue litmus paper, any one can make soil tests that are at once instructive and enlightening.

Of all the activities imposed upon the tax payers as rural uplifters, experts, specialists, etc., the agricultural press throughout the country is of more value to practical agriculture than all other agencies combined. The reason is that they disseminate all the useful discoveries of science and contain the actual experience of thousands of close observers and practical knowledge from all parts of the country.

After deliberating and considering the situation, I have concluded that it is time to call a halt and cry out "hold, enough!" When stalwart farmers follow their shipments to market and shed tears because their strenuous labor in producing tomatoes, peas, beans, potatoes, peaches, etc., do not realize enough cash to pay trolley fare, finding themselves in debt for freight and commission having labor, taxes, with incidental operating expenses drives them to insanity and even suicide. At the same time more rural uplifters manifest their interest in agriculture, among whom are newspaper publishers who could not distinguish between alfalfa and clover, between a jack and a giraffe. Yet they presume to trade on the credulity of farmers, assuming an attitude of friendship for benighted ruralists.

Even highly perfumed town dudes wearing creased pants, looking through their bi-noculars have regard for the farmer; treating former mud-sills and cold hoppers with a show of respect, because they hope by passing a few years in some institution where agriculture is taught to gain positions as county agents or professors of some sort and on the pay roll of a State. After passing through the corridors of some college from room to room listening to lectures, in a short time they emerge as from a cocoon, full-fledged agents of "agentesses" to be quartered on the community.

Real farmers are getting tired of being chastised, harangued, scolded, offered free advice and encouraged to rob the soil in order to produce more and cheaper butter, eggs and other products, costing more than they bring in the market. Having attained such a degree of efficiency with "greatest economy," it is not necessary to bear the burden of increasing taxation to maintain an army of self-constituted guardians of agriculture in this country. Therefore, they should be provided with picks and shovels, crowbars and overalls to demonstrate the power of the fulcrum in prying out rocks and the proper angle to use tools with the least waste of energy and the greatest efficiency on the roads. Our new dependencies, Alaska, Cuba, Porto Rico, the Philippines, need scientific advice where numbers might be assigned and some to China, India and Persia where the inhabitants frequently perish of starvation. Using the phrase "greatest efficiency and economy," may be considered as a joke in our laws, likely introduced by some humorous member of the Legislature from Philadelphia or Pittsburg to catch the unwary ruralists with a few meaningless words regarded as a "scrap of paper."

Farmers can get many things they don't want or ask for but reduced expenses, revision of our tax laws, the initiative, the referendum and recall are treated with contempt. There are throughout the country a class of persons manifesting uncommon interest in the farmers business, constantly prodding them on to raise larger crops when it is a well known fact that maximum crops are as a rule not remunerative. As an illustration: Take fifty bushels of wheat at one dollar per bushel, is worth more than a hundred bushels at fifty cents per bushel. Each sixty pounds of grain removes twenty cents worth of fertility at normal prices for fertilizers while the difference in value is more than made up in the extra cost of harvesting, threshing and marketing. At prevailing prices for fertilizers with potash at $400 per ton, nitrate and phosphorus 40% higher, the fertility loss is vastly greater.

Since the passage of the Act there is money in view and more in prospect for extension work which creates rivalry between Boards of Agriculture and Departments and Experiment Stations, each striving to secure a share for good, round salaries to place rural uplifters in the field having more regard for the dollars than for the farmers' prosperity. It appears as if farmers were regarded as public servants not engaged in private business, and were expected to dig out of the soil the support of all others many of whom "do not labor, nor do they spin" but live as parasites upon agriculture enjoying the best the land affords, yet crying for more, more! The scheme to impose upon the country some two thousand uplifters (one in each county in the country) did not originate from farmers, but was promoted by a number of railroad officials, bankers, politicians, a few editors and manufacturers styling themselves "The National Fertility League," through their activities had the Smith Lever bill passed. It is quite surprising to know how the farmers are esteemed these days and tickled like aphids are by ants to yield up sweet secretions to their tormentors.

Now that there is some show of prosperity in some lines of agriculture due to European conditions, it is worth while to watch Congress where the demand will be for appropriations and more appropriations for a variety of uses—good, bad and indifferent—only to increase the cost of extravagance and burden upon the honest industry.

REPORT OF THE COMMISSION ON COUNTRY LIFE

It is six years since the then President (the same who may be again President) reported after traversing many states and collecting information through circulars on the condition of agriculture and rural life.

Among the recommendations to improve conditions are the following: Schoolhouse meetings, the preservation of natural resources, preservation of forests and streams, etc.

They condemn the holding of land for speculative purposes, monopolistic control of water power, restraint of trade, and, in a general way, trusts, combinations and monopolies, also intemperance.

In this way they touched a vital spot on economical problems which was not appreciated by the beneficiaries of the so-called "men of affairs," so that instead of publishing the report in detail for general circulation as a public document it was confined to a limited issue for members of Congress.

The representatives in Congress and agents of "Divine Providence" evidently saw that it reflected upon special interests, promoters and speculators who did not care to see it published to the world that American farmers are exploited by combinations of capital, transportation, mining and manufacturing interests.

The commission received the same compensation that many of us receive only having their expenses paid.

With a view to get the report before the public and obtain a little compensation for their time the commission placed the report in the hands of a publishing house, and any profit derived from the publication accrues to the members of the commission.

Sturgis & Walton Company, N. Y., are the publishers.

REPORT OF THE ECONOMIC GEOLOGIST

By BAIRD HALBERSTADT, F. G. S.

During the eight years of my encumbency of the office of Consulting Specialist in the Department of Mineralogy and Geology, fully ninety per cent. (90%) of the specimens of minerals forwarded to me from various parts of the Commonwealth by farmers and others have been of the same species, varying only perhaps in form. In none of the localities from which these came does this mineral appear to exist in deposits of value nor do large deposits of it of commercial importance seem to have been found in any part of Pennsylvania, certainly none have been in the past nor are any being exploited, on a commercial scale, at the present time. Notwithstanding this, there has been no mineral, perhaps, that has raised so many false hopes, and has been so often the foundation upon which so many "Castles-in-Spain" have been erected.

It has fallen to my official lot and always with a deep sense of regret, if not sorrow, to be obliged to shatter these "Castles" and to inform the prospectors or senders, that they have been building foundations with sand and that their long cherished hopes of great wealth, if based upon this mineral alone, will not be realized. Men, women and children indulge in fond hopes and one of these is the acquisition, sooner or later, of great financial wealth. If these indulgences bring pleasure only, no harm is done and it is even perhaps well that such hopes are entertained rather than gloomy forebodings. When, however, it is at the expense of time, money and labor, the disappointment that usually follows is keen, if not bitter. It must not be inferred that this mineral has no value but, on the contrary, it is a very important one. To be commercially valuable, the ore must occur in deposits of sufficient size and purity, at accessible localities, to make its exploitation or mining profitable. Comparatively speaking, the number of such developed deposits in the United States is relatively small, and these are usually found in the crystalline schists of the earliest geological formations.

To prevent further vain searches and the consequent losses of both money and happiness, it has been thought well to make this mineral the subject of my report for the current year, and to present it in such form, that even those who have little or no acquaintance with Mineralogy will no longer be deceived by it. An attempt, therefore, will be made to explain the origin, the occurrence, the uses and the value of this mineral and how to distinguish it from the more valuable minerals for which it is frequently mistaken, by the layman.

The mineral referred to is Iron Pyrites or Bisulphide of Iron (FeS_2). It is also known as mundic, a term applied to it by the miners, and as "Fools Gold." The name *pyrites,* a Greek word, means fire stone. The elder Pliny refers to it in his "Naturalis Historia," written over eighteen hundred (1,800) years ago; "There is much fire in it."

It was years ago used in place of flint on fire arms and on tinder boxes. From this, it is seen, that the mineral, under consideration has long since been known and it is quite probable that it has deceived, through all these centuries, countless thousands just as it is doing some people at the present time, and all because of its mischievous color resemblance to the precious metal gold, and its very wide dissemination or distribution in rocks of all kinds and of all geologic ages.

ORIGIN

The origin of and the mode of precipitation of iron pyrites are still, in some cases, questions of doubt. One theory is that iron pyrites result from the action of sulphuretted hydrogen upon salts of iron. Dr. Spurr has observed that: "In shale beds, there is always a considerable percentage of iron. This usually combines with the sulphur contained in organic matter to form sulphide of iron (pyrite)." Some of it is probably of igneous origin.

OCCURRENCE

Iron pyrite is a very widely disseminated mineral. It occurs in rocks of all varieties and in all geological formations, from the earliest to latest, usually and unfortunately, however, in quantity or amount too small to make its separation a profitable undertaking. It may occur as bedded or vein deposits, or sporadically, as crystals in cubic form or some of its modifications; as nodules or lentils, in thin flakes or small particles throughout, slates, shales, schists, sandstones, etc. It is also found in coal beds, sometimes appearing as nodules; as partly separating the coal benches either as hard masses or intermixed with the mineral charcoal bands so often found in coal beds and known to the miners as "Mother of Coal." Again, it may be found in flakes as thin as the finest tissue paper adhering to the coal, along lines parallel to or at right angles to the planes of stratification in joints, where sometimes are found thin slabs, perhaps a foot or more in length covered with small cubic crystals, with a brilliance almost equal to that of cut diamonds. Its presence in coal is always detrimental and, in extreme cases, so much so that for either the manufacture of coke for metallurgical purposes, the use of such coal is precluded, because of the increase in sulphur content of the coal due to its presence.

The deposits of this mineral of economic value, now being exploited in the Eastern United States, seem to lie, geologically, in a belt of the Pre-Cambrian metamorphic rocks, extending, according to Prof. Reis, from New Hampshire to Alabama. The principal sources of domestic supply are in New York, Virginia, Missouri, California and Wisconsin. (In the latter state, the pyrite is separated from zinc blende by electrostatic methods;) while as a by-product in coal mining, Ohio, Indiana and Illinois produced 47.486 long tons in 1913. The production of pyrites in Pennsylvania has been very small and was limited to by-products of coal mining and not from distinct operations for the production of this mineral only.

GENERAL DESCRIPTION

Pyrite (Bisulphide of Iron) is a mineral of brassy yellow color; it is often found in the form of a cube, sometimes as an octahedron (8 sided) and as a five edged twelve sided crystal known as the pyritohedron or other forms of the isometric system. Again, it may occur in crystalline masses which may assume any form; sometimes it appears in the form of a bunch of grapes or botryoidal; again, it may be globular or in stalactitic form. It is extremely hard and brittle. In the scale of hardness, it ranges from 6 to 6.5, that is to say, it is harder than orthoclase (feldspar) and not quite as hard as quartz. The streak it leaves, after being rubbed on an unglazed porcelain or other white surface, is greenish to brownish black. It is opaque or impervious to rays of light, no matter how thin the piece may be. Its specific gravity is 4.9 to 5.2, being less than one-third as heavy as gold (19.26) and about one-half as heavy as silver (10.5). If the faces or sides be carefully examined it will be noticed that these are striated, that is fine grooves or scratches will be found. These, it will be further noticed are at right angles to each other on adjoining faces or sides of the cube.

COMPOSITION

Iron Pyrites or Bisulphide of Iron is a combination of sulphur and iron; when pure, the sulphur percentage is 53.4%, while that of the iron is 46.6%. It frequently contains copper, arsenic, nickel, cobalt, gold or other minerals but in very small quantities.

USES

The principal use to which Pyrite is put is for the manufacture of sulphuric acid. Formerly, sulphate of iron or copperas was made from it but, as this is now obtained as a by-product of a process of galvanizing iron, the former method of producing it from pyrite has been superseded. (A few years ago, more than half of the sulphuric acid consumed in the United States was in the manufacture of superphosphates). Although this mineral is rich in iron, it is not used as an ore in the furnace, because of the excessive amount of sulphur it contains. Much of this injurious constituent can be eliminated by roasting the pyrite before using. The residue, "Blue Billy," is not, at the present time, considered a desirable ore for the manufacture of iron. The pyrite from some localities has, however, been successfully treated and is being used for the purpose. The "Blue Billy," after being treated to remove as much of the contained sulphuric acid as possible, is used to some extent in the manufacture of paint. It is not improbable, that before long, if not already, a successful process or method of treating the "Blue Billy" to remove its detrimental constituents will be found and its use in the manufacture of iron will be practicable and of economic importance.

HOW TO DISTINGUISH IT

The minerals for which iron pyrites may be mistaken are gold and copper (the latter in the form of chalcopyrite) and pyrrhotite. It will be found first, that the pyrite is harder than gold, as the former can not, except with great difficulty, be scratched with a knife blade; the pyrite is brittle, while the gold is soft and can be readily cut with a knife or hammered out into thin sheets. It differs from it both in color and the color of its streak. Chalcopyrite which is a sulphide of copper and iron can generally be distinguished from the pyrite by its greater softness (3.5) and with the naked eye, by its darker brassy color and its often irridescent tarnish, and the difference in its crystal forms. It is somewhat lighter in weight (specific gravity 4.25). Chalcopyrite crystallizes in the tetragonal system but is more frequently found as an ore mineral in irregular grains and masses. The color of its streak is greenish black.

Pyrrhotite or magnetic pyrites, another sulphide of iron, is sometimes mistaken for iron pyrites. It can readily be distinguished from it, because: (1) it is much softer; (2) its color is of a bronze rather than brassy yellow; (3) if it be broken into small pieces or powdered, it will adhere to a magnet. Its streak is grayish black, but, like the pyrite, it is brittle. Pyrrhotite may in turn be mistaken for bornite and niccolite, as some specimens of these resemble pyrrhotite. A test with the magnet will quickly settle the question of its identity.

Marcasite has the same chemical composition but differs from pyrite in appearance and form of crystals. Its color, when freshly fractured, is lighter or paler. Its streak is black. It decomposes more readily when exposed to atmospheric influences. Both the pyrite and marcasite are used for the same purposes.

PRODUCTION

The production of iron pyrite in the United States, its value, and the price per long ton for three years is exhibited in the following table:

MINERAL RESOURCES OF THE UNITED STATES

Marketed Production of Pyrite in the U. S., 1912-1914, by States, in Long Tons.

State.	1912.			1913.	
	Quantity.	Value.	Average price per ton.	Quantity.	Value.
California,	61,812	$201,453	$3 26	70,536	$218,525
Georgia,	*	*	*	11,110	55,034
Illinois,	27,008	62,980	2 33	11,246	31,966
Indiana,	1,462	5,684	3 89	1,242	3,115
Ohio,	14,487	43,853	3 03	13,622	34,998
Virginia,	162,478	621,219	3 82	148,259	587,041
Wisconsin,	17,898	70,518	3 94	25,328	94,727
Other States,†	65,783	328,552	4 99	59,995	260,618
Total,	350,928	$1,334,259	$3 80	341,338	$1,286,084

State.	1913.	1914.		
	Average price per ton.	Quantity.	Value.	Average price per ton.
California,	$3 10	71,272	$235,129	$3 20
Georgia,	4 96	*	*	*
Illinois,	2 84	22,538	59,079	2 62
Indiana,	2 51	1,710	5,281	3 09
Ohio,	2 57	7,279	19,718	2 71
Virginia,	3 96	141,276	556,091	3 94
Wisconsin,	3 74	14,188	78,460	5 53
Other States,†	4 34	78,399	329,588	4 20
Total,	$3 77	336,662	$1,283,346	$3 81

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*Included in "Other States."

†1912: Georgia, Missouri, New York and Pennsylvania; 1913 Missouri and New York; 1914: Georgia, Missouri and New York.

The marketed production of pyrite in the United States since 1882 is given in the following table:

Marketed Production of Pyrite in the U. S., 1882-1914, in Long Tons.

Year.	Quantity	Value	Year.	Quantity	Value
1882,	12,000	$72,000	1899,	174,734	543,249
1883,	25,000	137,500	1900,	204,615	749,991
1884,	35,000	175,000	1901,	*241,691	1,257,879
1885,	49,000	220,500	1902,	*207,874	947,089
1886,	55,000	220,000	1903,	*233,127	1,109,818
1887,	52,000	210,000	1904,	207,081	814,808
1888,	54,331	167,658	1905,	253,000	938,492
1889,	93,705	202,119	1906,	261,442	931,305
1890,	99,854	273,745	1907,	247,387	794,949
1891,	106,536	338,880	1908,	222,598	857,113
1892,	109,788	305,191	1909,	247,070	1,028,157
1893,	75,777	256,552	1910,	241,612	977,978
1894,	105,940	363,134	1911,	301,458	1,164,871
1895,	99,549	322,845	1912,	350,928	1,334,259
1896,	115,483	320,163	1913,	341,338	1,286,034
1897,	143,201	391,541	1914,	336,662	1,283,346
1898,	193,364	593,801			

*Includes production of natural sulphur.

The figures for 1915 are not at command but the enormously increased demand for sulphuric acid by the makers of high explosives has probably vastly increased the output of the United States and increased its cost.

REPORT OF COMMITTEE ON LIVESTOCK

By MR. W. F. THROOP, *Chairman.*

My chief interest lies in agriculture. That is why I am dairyman. The future of agriculture, which means the future of the people, is to a great extent bound up in dairying. Agricultural pre-eminence can best be conceived through the best development of stock husbandry. Any business gains in its returns, in its interests, in its attractiveness, just in proportion to its complexity; just in proportion to the natural effort it takes to handle it. When you introduce into the business of stock-raising the element of superior intelligence of plan, of purpose and long continued and persistent effort, just the minute that you put that business, or any other business before people who have money, just as long as it takes a mind to run a business it will attract other minds to it, and its future is assured.

We are just now in an era when the greatest intellectual pursuit of this country is agriculture. It takes more money, more plans, more courage more inspiration than any other kind of a farmer to be a dairyman. This is no reflection whatever on the grain farmer or any other farmer, because of the fact that we need the grain farmer to produce the grain that we cannot produce ourselves.

In discussing the question of livestock in Pennsylvania, I am at a loss where to begin, because we cannot rank as a real stock-raising state, although we do raise some and should raise lots more. But it is the condition of livestock in the State, the way we care for it in order to make it most profitable to the farming interest. When I say we are not a stock-raising state, I should go farther and say that the interests of the state are so many and varied. We probably have one of the best markets of the United States right in Pennsylvania, but we have allowed those markets to be largely supplied from the outside, more particularly the animal foods.

Pennsylvania is not considered a hog-raising state, although we do raise some, and good ones too. There is money in raising sheep, and certain sections of Pennsylvania are adapted to this industry. The dog nuisance is a serious obstacle, but that can be remedied or controlled by placing a higher value on the sheep than on the dog.

The horse industry in this State is a very important industry. By using pure bred sires, Pennsylvania may improve her horses. The tractor has not yet crowded the horse and his usefulness from the average farm as yet.

The theory of preparedness will apply to the breeding, raising and marketing of beef cattle. From reports of breeders of beef cattle in Crawford county the farmers throughout the state are finding ready sale for pure bred sires of a good strain within the last three months much better than within the last five years. The choice of breed is a matter of individual liking. There is no battle of breeds. The average citizen takes too little interest in the bulletins issued by the State and Federal Bureaus of Animal Industry, but the one prepared by the Committee of Statistics and Standards of the Chamber of Commerce of the United States should be interesting to every meat-eater. It says the future supply must come from the South. That section can produce more cheaply than any other section on account of its cheap lands. The pasture season is longer, grazing good, and feed can be produced at a minimum price, and shelter during the short winter is inexpensive.

In Pennsylvania there are thousands of acres of mountain land that is too rough for farming which could be used for grazing purposes to a very good advantage. Through the northern part of the State Canada blue grass can be raised, and the southern part of Kentucky blue grass, and there is no better pasture than these two grasses for producing a fine quality of meat.

In one of the daily papers of a recent issue, I found this article on livestock values in Pennsylvania. The article states that agricultural conditions are excellent and prospects of a big year for the farmer are bright. These are revised figures from a statistical report of the State Department of Agriculture: Milk cows and other cattle are rated as being 101% of the average, while horses, mules, sheep and hogs are up to the average for this State. The following divisions are made:

	Average Value.
Horses,	$121.00
Mules,	128.00
Milk cows,	55.50
Other cattle,	29.00
Sheep,	5.40
Hogs,	11.80

May the livestock breeders of the State of Pennsylvania look ahead to a broader future, by putting forth greater efforts, being prepared to feed the increased population, securing for ourselves health, wealth and prosperity.

REPORT OF THE COMMITTEE ON POULTRY

By W. THEO. WITTMAN, *Chairman.*

As Chairman of your Committee on Poultry, I would respectfully report that several interesting conditions have existed in this industry during the last year. That the consumption of eggs is still on the increase and that the quality of the eggs consumed, due to our Pure Food laws, is steadily improving, is without doubt. That the next logical step, after making sure that all eggs marketed shall be fresh or fairly fresh, is to see that all eggs are clean and are produced under sanitary conditions—a fresh or comparativley fresh egg is no guarantee that said egg is always desirable from a food standpoint.

That the amount of poultry consumed has increased or will increase is doubtful, for poultry meat consumption being one of the higher priced meats will decrease, with the general decrease of meat consumption, that seems inevitable. Neither does there seem to be any improvement in the quality of the poultry marketed and just as long as poultry generally is regarded as a luxury, chicken and turkey on the table will be regarded as "chicken" and as "turkey" regardless of its quality on the market. If growers could make growing specialty market poultry profitable or if that big class of producers, viz: farmers, would generally adopt caponizing, there would be a prompt and marked improvement in market or killing poultry.

The apparent decline in the interest shown in fancy or show poultry and in poultry shows or exhibitions mentioned in last year's report still continues. However, with the advent of good times, the demand for this kind of poultry and the prices for same have shown some improvement, although still way below those prevailing only a few years back.

Likewise, the enormous interest in utility or work-a-day poultry mentioned as having taken to a large extent the place once occupied by fancy poultry, continues unabated. This interest centered to a great extent on White Leghorns, and especially English White Leghorns, on Wyandottes, Rocks, Reds and anything that could make a record at laying eggs. Probably, of all these, the English White Leghorn and its crosses with native or American bred Leghorns, thanks to the liberal way Pennsylvania poultry people imported, predominate as an egg farm proposition. A striking example of the good of all this is the hen Lady Eglantine, winner of the late North American egg laying competitions and of the world's record, with a total of 314 eggs laid in one year and owned by Mr. A. A. Christian, a Philadelphia man, but with his farm at Greensboro, Md. This now world famous hen is not only part of this English blood but is a living monument to the science of breeding and should for all time put the quietus on the foolish claims of some that production, or, the ability to lay heavily can not be bred into hens. It is entirely correct to say the Lady Eglantine was deliberately made by her owner—made for the purpose of laying eggs.

Just what sort of laying 314 eggs in one year is, can best be comprehended by comparing the average number of eggs laid by the hens on the farms of this State as gathered by the census enumerators for the census of 1910, viz; 68 eggs, 314 eggs and 68 eggs! It would seem there is still a great deal of missionary work to be done among our farmers if their hens are to lay anything approaching a maximum yield—your Chairman would urge that the individual members of this State Board of Agriculture would do their mite of this sort of work by the good example of tolerating nothing but pure-bred poultry on their home farms.

The wet summer of this past year found at its end probably the best grown lot of chickens seen for many a year. This was true on farms, on egg farms and large poultry plants or wherever growing chickens were enjoying free range. Chickens matured early, grew big frames and broad lustrous feathers, either directly due to the wet season or indirectly to the abundance of succulent growing things and insect life.

Highest returns this year to any of our egg farmers was 63 cents per dozen with a break in price the earliest yet known. Fall eggs, not winter eggs, now reach maximum prices, probably because, first, more chickens are hatched early; second, more storage eggs come out early.

Your Chairman within the last year made a return trip to the Pacific coast and diligently employed the opportunity to study poultry possibilities and prospects not only there but enroute over two widely divergent routes and is more fully convinced than ever that Pennsylvania offers as many opportunities to make good with poultry as any other state or section.

REPORT ON FORESTS AND FORESTRY

By IRVIN C. WILLIAMS

The record of the legislation in 1915 for forestry in Pennsylvania is a satisfactory one, evidenced by the passage and approval of 8 different acts of assembly.

Under the new laws, land suitable for forestry purposes held in ownership by the counties must be offered for sale to the Department if required. The price to be paid is the amount of taxes due, plus interest and costs.

For a number of years forest trees seedlings were sold by the Department at cost of growing. Many thousands of young trees were distributed over the State by these means and paid for by citizens interested in tree planting. The new act permits the Department of Forestry to distribute excess trees, in stock, for the asking, under reasonable provisions relating to planting, growing, and subsequent sale. This puts the distribution of trees in line with the distribution of fish and game, which has long been done in a similar way at the expense of the State.

In an attempt to procure a more efficient execution of the laws relating to game, fish, and forestry, a new act of Assembly requires all the employes of these three departments to protect the interests and assist in executing the laws of others.

When the Department of Forestry was established in 1901, a limit of $5.00 per acre was set for the purchase of lands. This was a safeguard which we believe was properly inserted in the law at the time. The problem of buying lands for State forestation then was a new one and such a check relieved the Department of an untold probable amount of pressure which otherwise probably would have been brought upon it to purchase lands at high price. At the last session of the Legislature the limit of price was increased from $5.00 to $10.00 per acre. This will enable the Department to purchase a number of small interior holdings actually worth more than $5.00 per acre, and thus enable a better consolidation of the State Forests. This is valuable from the viewpoint of protection as well as from desirability of solidified land ownership.

The experiment of the Department entering into co-operative relations with the act of 1913, has been a success. The Department is now actively co-operating with the Pocono Fire Protective Association and with the Central Forest Protective Association, each of which organizations are interested in large areas requiring better protection and ultimate forestation. An amendment to the law of 1913 enlarges the powers of both the Department and the local organization and gives them a better working program.

In order that local development may not be hindered by the presence of large bodies of State land acting as a barrier to a greater or less degree, the recent Legislature enlarged the powers of the Department with respect to granting rights of way. It ought not to be the policy of the State Government to set up any obstruction in the path of private local improvement, especially when such improvement is dependent upon a right of passage through lands which otherwise would be closed to entrance.

The school code of Pennsylvania provides for a State School Fund, to which moneys shall be added from time to time as they are derived from various sources. Originally it was provided that 80% of the net proceeds of the State Forests should be added to this fund. The difficulty of calculating net proceeds when the fifty or more State Forests are taken into consideration, as well as the reduction from 100% to 80% of these proceeds as an addition to the

State School Fund, would have continued to operate against the increase of that fund. The Department of Forestry has always felt that the State School Fund might well receive the entire proceeds derived from State Forests, and in a few years these proceeds must, in the nature of things, become large, thus accelerating this mast valuable fund to a larger and better degree. By an amendment passed to appropriate sections of the school code, all proceeds from the State Forests are paid immediately into that fund. The revenues of the Department from its inception to date are in the neighborhood of $125,000. By an act of appropriation, $80,000 of this amount was specifically appropriated and applied to the State School Fund. With further forest development and the marketing of forest products, the proceeds will increase from month to month. Those paid into the Treasury during the month of December last past and immediately credited to the State School Fund, amounted to $2,090.03.

By all odds the most valuable piece of legislation procured at the last session was the forest protection code, which completely revises the system of forest fire wardens, establishes a bureau in the department to take care of forest protection exclusively, places at the head of the bureau a person competent to do this work, who devotes his time exclusively to protection, and who has since been actively engaged in the revision of the whole system.

Forest fires are still prevalent in Pennsylvania. The average size and average damage wrought by fire is gradually being decreased. With a better fire fighting system and with a greater awakening to the necessity of preventing and extinguishing fire, Pennsylvania will surely soon be able to take her position among other forested states who have larger appropriations for fire protection and are reducing the fire problem to a very small matter. The density of Pennsylvania's population, the diversity of her industries, and the unparalleled opportunity for permitting fires to burn, coupled with a certain viciousness of disposition which is still found in individuals as well as in groups of men, along with the difficulty in the majority of cases and at times the utter impossibility of procuring evidence sufficient to secure a conviction of offenders, when considered in connection with the aggregate areas burned and the resulting loss from fires, is a source of satisfaction at least, although the Department will never rest satisfied with its efforts until it is in a position to maintain complete and efficient control. The Department of Forestry is dependent entirely upon legislative appropriation for means to do this work, and we can only say, as has been said on numberless previous occasions, that this problem is one resting wholly upon the Legislature. Without means the Department can do nothing. With adequate means it can equal, and we believe exceed, many of the other states. A forest fire appropriation of $45,000 allowed for two years in 1915, is utterly inadequate to meet our needs and conditions. The records of the Department show that during 1915 there were 1,104 forest fires reported upon by the forest fire wardens.

The record of accomplishment for the Department of Forestry to date stands as follows:

It has purchased and paid for out of legislative appropriations, 1,008,140 acres of land, costing an average price of about $2.28 per acre.

It has educated foresters to care for this land, now divided into 54 forests, each of which is in the care and administration of a technically trained State Forester.

Forest administration is dependent upon roads, trails, fire lanes, telephone lines, observation towers, a protective force of forest rangers, and an interested group of people in its neighborhood who are willing to lend a hand at a moment's notice to prevent destruction by fire. The foresters and their assistants to date have built over 3,500 miles of travelable roads, trails, and fire lanes. Upwards of 250 miles of telephone lines are constructed. These connect rangers' homes with forest headquarters, and these again with the general telephone system of the State. Foresters are doing improvement work and taking out undesirable material and selling it for the best price to be obtained. The revenue of the Department is largely derived from this class of sales.

The foresters and their assistants have planted upwards of 18,000,000 seedling trees of good species, and have covered more than 8,500 acres, otherwise denuded, unprofitable land.

The State Forests have been thrown open to become the camping ground and recreation places of the citizens of the State. What are known as permanent camp sites, under formal lease for a period of ten years or less, may be had for a trifling annual sum. Temporary camp sites are permitted without charge. In the case of the former, there is exclusive use by the lessee of his camp site, with the privilege of building upon it such a structure as meets the approval of the Department.

The whole force of the Department is interested in carrying the knowledge of its work to the people. Educational efforts are under way in all parts of the State. Foresters and rangers take an interest in the school children and afford them facilities for enjoying the State Forests. The newly formed Bureau of Education within the Department will collect statistics and information, and through the newspapers, principally those in the counties and rural neighborhoods, will keep the people informed of the weekly progress of events.

The Department of Forestry regards itself as the servant of the people. It is ready at all times to afford such assistance with respect to the scope of its business. It is particularly desirous of awakening a greater and better sustained interest in farm woodlots. The owner of any farm having upon it a woodlot which is in need of improvement or other treatment, may, for the asking, have the advice and direction of the Department in its handling. While our facilities at present may be limited by lack of means and lack of men, the desire to help is constantly with us.

The Department has recently undertaken topographical surveys of its forests and a complete delimination of its boundaries. The latter has been going on for a number of years and boundary surveys are in their incipiency but to date four forests have been satisfactorily covered. With topographical work goes the taking of an inventory or the making of a stock survey, so that it will soon be possible to know what amount of material is contained within each forest, its character and its value.

The Pennsylvania forests are not set aside as reserve areas and locked up. The people of Pennsylvania are not denied participation in the general use of the woods; but to the contrary, as above stated they are specifically invited to use these woods under a few reasonable regulations necessary for their proper protection.

The establishment of the State Forests and their proper development will result in two things of great value in the future to Pennsylvania: First, a new wood supply, and secondly, the protection and development of our water resources. The question of a pure and adequate water supply is already confronting us in a very noticeable way. The continued settlement of the State, the increase of population density, the establishment of new industrial plants will cause this problem in the near future to be one of still greater importance. The Department is now authorized to grant to municipalities the right to receive water supply from State lands, when so situated that it may be economically derived.

The Forest Academy is still educating young men for the forest service. For proper administration, Pennsylvania foresters are at present too few. With intensive administration the forest areas in charge of each forester must be reduced. This requires more foresters, and they are specifically educated for this purpose at the State Forest Academy.

Because of her ribbed and mountainous character, Pennsylvania has a large area of land suitable for no other purpose than the growing of trees. At least 8,000,000 acres of land of this character can scarcely ever be made to produce anything else of importance. A larger proportion of this area should be put under State Forests than at present. Therefore, purchases of land for forest purposes by the State should be continued through a liberal and well sustained policy. Forest land in State ownership is better protected and better developed than ordinary wild mountain land in the hands of the private owner. Lack of capital and of disposition permits private land to lie wild and devastated. No Pennsylvania acre should lie waste, but ought to be made to produce its full quota of return for the benefit of the whole State. Now forest planting must be continued in areas where trees cannot grow because of destructive lumbering, forest fires, and the removal of all seed trees. Our plantings should be largely increased and well they might be, were the means at hand to do the work. This Department may and ought to become one of the most useful adjuncts of the State Government; but there is no possibility of its becoming so unless it is better sustained and permitted to enjoy a wider and more comprehensive development by intelligent legislative action.

FEEDING STUFFS REPORT

By GEO. G. HUTCHISON

The work of the Department in enforcing the law regulating the sale of Feeding Stuffs during the year which has just closed has continued along the lines as in previous years, and as each year goes by the need of such a law becomes more apparent. It would be difficult to imagine what the condiiton or character of the Feeding Stuffs sold in Pennsylvania would be if we did not have such a law as is now on our statute books and which is being rigidly enforced. While much progress has been made in bettering the feeds sold in the State, it is still necessary to be on the watch for new feeds or by-products which from time to time, are being utilized for feeding purposes, to watch out for adulterants, and to make sure that the consumers of the State are receiving feeds correctly guaranteed and the full value of their money paid out for the same.

There are thirty-six (36) states which have feeding stuffs laws, five (5) that have general food laws which, in a measure, regulate the sale of feeding stuffs, and seven (7) which have no laws at all. In these states, therefore, which have no laws, a few of which are close to our borders, it is easy to imagine the character of the feeds sold in such states and it sometimes occurs that a feed intended to be sold where there is no regulation gets into Pennsylvania, as is shown by the fact that recently we found a certain brand of feed which had come into Pennsylvania which contained about 40% of ground peanut hulls. This is an instance of how the consumers are being protected by our own feeding stuffs law and by a special arrangement with the United States Department of Agriculture on interstate shipments. The Chief Chemist upon finding such a brand of adulterated feed being sold can report the case to the Federal authorities and thus our own Department working, with the Federal Department can protect the consumers from such frauds. The usual number of feeding stuffs registrations, which show about 1,200 different brands of feeds being sold in the State, are filed each year which assists greatly in enforcing the provisions of the act and enables us to keep in touch with the character of the various brands being sold.

One form of misrepresentation which the Department is endeavoring to correct, is the use of the so-called "sliding guarantees" for protein, fat and fiber which are not only misleading and not in agreement with the requirements of the act but which, in many cases, does not show the true composition of the feed, as is often found by analysis. Some idea of the importance of the work to the farmers and consumers of our State can be gained from the fact that according to the Bureau of Statistics of our Department, there are the following number of heads of livestock within the borders of our State.

Dairy cows,	952,000
Horses,	596,000
Mules,	46,000
Other cattle,	644,000
Sheep,	806,000
Hogs,	1,186,000
Making a total of,	1,230,000

From what statistics can be secured, at least 600,000 tons of feeding stuffs are sold annually in the State, the greater portion of which is imported from other states; having a total valuation at a low average price of $25. per ton, or fifteen million dollars. The amount of feed required to feed such a large number of livestock for one year would total at least, on a conservative estimate, 6 million tons. While Pennsylvania is a large agricultural state and produces great quantities of feed within its borders, it does not produce enough to meet this enormous need, which is one explanation of why such great quantities of feeds are imported from other states for home consumption. As the cities increase in size and the country developes along this line, the area of land devoted to producing food usually decreases which, in a large measure, has made the demand for mixed feeds so great.

Fifteen years ago when the feeding stuffs industry first commenced, this condition did not exist and many valuable by-products were thrown away as useless, but as the demand for feeds of all sorts has increased, every possible by-product that could be used for feed has been conserved and utilized, sometimes as straight feeds and in many cases as ingredients in the many brands of mixed feeds. From the reports made to this body from year to year, you have become familiar with most of the feeds or by-products now being used, but from time to time, new products are being utilized and during the past year the feeding value of three by-products has been discovered and these are now being used, namely, yeast and vinegar, dried grains, ivory nut meal and cocoa shell meal.

The yeast and vinegar dried grains were, before the recent embargo on exportation, being sold largely abroad but during the first part of the year our Department discovered that this product was being sold in the State as straight distillers' dried grains at about $7 less per ton than the usual price for distillers' dried grains. After an investigation by our chemists and agents, and a visit to the plants where this material is being produced, it was discovered that instead of being distillers' dried grains it was the residue of the dried grains left from the manufacture of yeast and vinegar. As a result of this work, this product is now being sold in the State as yeast dried grains properly guaranteed for protein, fat and fiber. This material is a valuable by-product feed although it does not contain quite as much value of distillers' grains from corn but contains a little more than the distillers' grains from rye.

The ivory nut meal, referred to, is an interesting product as it is the ground cuttings from the ivory nut from which buttons are made. This material has a bony, hard structure, but when pulverized and ground into a fine meal, it possesses some feeding value and a portion of it is digestible. It has the following composition: Protein 4.50%, fat 0.85%, and fiber 8.30%. The law does not prohibit the sale of this particular material, and, therefore, we can make no objection to its use although in every feed on which it is used as an ingredient, it must be stated on the sacks or on the tags that it forms a part of the feed.

The cocoa shell meal has been used for about a year as an ingredient in mixed feeds and is the ground shells left from the bean from which cocoa is made. This product has the following average analysis: Protein 16%, fat 3.50%, fiber 12-14%. A study is now being made of the value as a feed of garbage tankage, and this may be placed on the market as an ingredient for mixed feeds later, although the process of manufacture has not developed far enough to warrant its being offered for sale. Other by-products of interest which some people are trying to mix in feeding stuffs is peat, which is sometimes called humus. This material contains a large proportion of sand and insoluble matter and the Department has refused to permit the sale of any feed in the State which contains this product as an ingredient.

The Department has received splendid support and co-operation in the work being done along this line, from the dealers and feed manufacturers of the State, and also of the United States. A few years ago an organization was formed, called the Association of Feed Control Officials of the United States, made up of the officials of each State which were in charge of the enforcement of the feeding stuffs laws. Our Department has been represented at these meetings by the Secretary of Agriculture, the Chief Chemist and the writer. Much valuable information has been secured as a result of these meetings, as special attention is paid to the study and discussion of the various by-products being used and definitions have been adopted for practically every product known to the trade. The definitions which, up to date, have been adopted are as follows and will be included in the report, but I will not take up your time in reading them now.

MEAL is the clean, sound, ground product of the entire grain cereal or seed which it purports to represent.

CHOP is a ground or chopped feed composed of one or more different cereals or by-products thereof. If it bears a name descriptive of the kind of cereals, it must be made exclusively of the entire grains of those cereals.

SCREENINGS are the smaller imperfect grains, weed seeds and other foreign material having feeding value, separated in cleaning the grain.

ALFALFA MEAL is the entire alfalfa hay, ground, and does not contain an admixture of ground alfalfa straw or other foreign materials.

BLOOD MEAL is ground dried blood.

MEAT SCRAP AND MEAT MEAL are the ground residues from animal tissue exclusive of hoof and horn. If they contain any considerable amount of bone, they must be designated MEAT and BONE SCRAP or MEAT AND BONE MEAL. If they bear a name descriptive of their kind, composition or origin, they must correspond thereto.

DIGESTIVE TANKAGE is the residue from animal tissue exclusive of hoof and horn, specially prepared for feeding purposes by tankage under live steam, drying under high heat, and suitable grinding. If it contains any considerable amount of bone, it must be designated DIGESTIVE MEAT AND BONE TANKAGE.

CRACKLINGS are the residue after partially extracting the fats and oils from the animal tissue. If they bear a name descriptive of their kind, composition or origin, they must correspond thereto.

BREWERS' DRIED GRAINS are the properly dried residue from cereals obtained in the manufacture of beer.

DISTILLERS' DRIED GRAINS are the dried residue from cereals obtained in the manufacture of alcohol and distilled liquors. The product shall bear the designation indicating the cereal predominating.

MALT SPROUTS are the sprouts of the barley grain. If the sprouts are derived from any other malted cereal, the source must be designated.

BUCKWHEAT SHORTS OR BUCKWHEAT MIDDLINGS are that portion of the buckwheat grain immediately inside of the hull after separation from the flour.

CORN BRAN is the outer coating of the corn kernel.

CORN FEED MEAL is the sifting obtained in the manufacture of cracked corn and table meal made from the whole grain.

CORN GERM MEAL is a product in the manufacture of starch, glucose and other corn products, and is the germ layer from which a part of the corn oil has been extracted.

GRITS are the hard, flinty portions of Indian corn, without hulls and germs.

HOMINY MEAL, HOMINY FEED, OR HOMINY CHOP is a mixture of the bran coating, the germ and a part of the starchy portion of the corn kernel obtained in the manufacture of hominy grits for human consumption.

CORN GLUTEN MEAL is that part of commercial shelled corn that remains after the separation of the larger part of the starch, the germ and the bran, by the processes employed in the manufacture of cornstarch and glucose. It may or may not contain corn solubles.

CORN GLUTEN FEED is that portion of commercial shelled corn that remains after the separation of the larger part of the starch and the germ by the processes employed in the manufacture of cornstarch and glucose. It may or may not contain corn solubles.

COTTONSEED MEAL is a product of the cottonseed only, composed principally of the kernel with such portion of the hull as is necessary in the manufacture of oil; provided that nothing shall be recognized as cottonseed meal that does not conform to the foregoing definition and that does not contain at least 36 per cent. of protein.

PRIME COTTONSEED MEAL must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, yellow, not brown or reddish, free from excess of lint, and must contain at least 38.6 per cent. of protein.

CHOICE COTTONSEED MEAL must be finely ground, not necessarily bolted, perfectly sound and sweet in odor, yellow, free from excess of lint and must contain at least 41% of protein.

GOOD COTTONSEED MEAL must be finely ground, not necessarily bolted, of sweet odor, reasonably bright in color, and must contain at least 36 per cent. of protein.

COTTONSEED FEED is a mixture of cottonseed meal and cotton seed hulls, containing less than 36 per cent. of protein.

COLD PRESSED COTTONSEED is the product resulting from subjecting the whole undecorticated cottonseed to the cold pressure process for the extraction of oil, and includes the entire cottonseed less the oil extracted.

GROUND COLD PRESSED COTTONSEED is the ground product resulting from subjecting the whole undecorticated cottonseed to the cold pressure process for the extraction of oil, and includes the entire ground cottonseed less the oil extracted.

FLAX PLANT BL-PRODUCT is that portion of the flax plant remaining after the separation of the seed, the best fiber and a portion of the shives, and consists of flax shives, flax pods, broken and immature flax seeds and the cortical tissue of the stem.

LINSEED MEAL is the ground product obtained after extraction of part of the oil from ground flaxseed screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes.

OIL MEAL is the ground product obtained after the extraction of part of the oil by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents from seeds which have been screened and cleaned of weeds seeds and other foreign materials by the most improved commercial processes. When used alone the term "oil meal" shall be understood to designate the product obtained from screened and cleaned flaxseed. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to the word "oil meal."

OLD PROCESS OIL MEAL is the ground product obtained after extraction of part of the oil by crushing, cooking and hydraulic pressure from seeds screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "old process oil meal" shall be understood to designate the product obtained from partially extracted, screened and cleaned flaxseed. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "old process oil meal."

NEW PROCESS OIL MEAL is the ground product obtained after extraction of part of the oil by crushing, heating and the use of solvents from seeds screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "new process oil meal" shall be understood to designate the product obtained from partially extracted, screened and cleaned flaxseed. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "new process oil meal."

UNSCREENED FLAXSEED OIL FEED is the ground product obtained after extraction of part of the oil from unscreened flaxseed by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents. When sold without grinding the unground product shall be designated as "unscreened flaxseed oil feed cake."

INGREDIENTS OF UNSCREENED FLAXSEED OIL FEED—Ground cake from partially extracted flaxseed and foreign seeds (wheat, wild buckwheat, pigeon grass, wild mustard, etc.)

SCREENINGS OIL FEED is the ground product obtained after extracting part of the oil by crushing, cooking and hydraulic pressure, or by crushing, heating and the use of solvents from the smaller imperfect grains, weed seeds and other foreign materials having feeding value separated in cleaning the grain. The name of the grain from which the screenings are separated shall be prefixed to "screenings oil feed."

OAT GROATS are the kennels of the oat berry.

OAT HULLS are the outer chaffy coverings of the oat grain.

OAT SHORTS are the covering of the oat grain lying immediately inside the hull, being a fuzzy material carrying with it considerable portions of the fine floury part of the groat obtained in the milling of rolled oats.

CLIPPED OAT BY-PRODUCT is the resultant by-product obtained in the manufacture of clipped oats. It may contain light, chaffy material broken from the ends of the hulls, empty hulls, light, immature oats and dust. It must not contain an excessive amount of oat hulls.

RICE BRAN is the cuticle beneath the hull.

RICE HULLS are the outer chaffy coverings of the rice grain.

RICE POLISH is the finely powdered material obtained in polishing the kernel.

WHEAT BRAN is the coarse outer coatings of the wheat berry obtained in the usual commercial milling process from wheat that has been cleaned and scoured.

SHORTS OR STANDARD MIDDLINGS are the fine particles of the outer and inner bran separated from bran and white middlings.

WHEAT WHITE MIDDLINGS OR WHITE MIDDLINGS are that part of the offal of wheat intermediate between shorts or standard middlings and red dog.

SHIPSTUFF OR WHEAT MIXED FEED is a mixture of the products other than the flour obtained from the milling of the wheat berry.

RED DOG is a low grade wheat flour containing the finer particles of bran.

WHEAT BRAN WITH MILL RUN SCREENINGS is pure wheat bran plus the screenings which were separated from the wheat used in preparing said bran.

WHEAT BRAN SCREENINGS NOT EXCEEDING MILL RUN is either wheat bran with the whole mill run of screenings of wheat bran with a portion of the mill run of screenings, provided that such portion is not an inferior portion thereof.

TENTATIVE DEFINITIONS.

YEAST OR VINEGAR DRIED GRAINS are the properly dried residue from the mixture of cereals, malt and malt sprouts (sometimes cottonseed meal) obtained in the manufacture of yeast or vinegar, and consist of corn or corn and rye from which most of the starch has been extracted, together with malt added during the manufacturing process to change the starch to sugars, and malt sprouts (sometimes cottonseed meal) added during the manufacturing process to aid in filtering the residue from the wort and serve as a source of food supply for the yeast.

OIL CAKE is the residual cake obtained after extraction of part of the oil by crushing, cooking and hydraulic pressure from seeds screened and cleaned of weed seeds and other foreign materials by the most improved commercial processes. When used alone the term "oil cake" shall be understood to designate the product obtained from partially extracted, screened and cleaned flaxseed. When used to cover any other product, the name of the seed from which it is obtained shall be prefixed to "oil cake."

GROUND OIL CAKE is the product obtained by grinding oil cake. When used alone, the term "ground oil cake" shall be understood to designate the product obtained from partially extracted, screened and cleaned flaxseed. When used to cover any other product the name of the seed from which it is obtained shall be prefixed to "ground oil cake."

GROUND FLAXSEED OR FLAXSEED MEAL is the product obtained by grinding flaxseed which has been screened and cleaned of weed seeds and other foreign material by the most improved commercial processes.

PALM KERNEL OIL MEAL is the ground residue from the extraction of part of the oil by pressure or solvents from the kernel of the fruit of the elaeis guineensis or Elaeis malanococoa.

IVORY NUT MEAL is ground ivory nuts.

PEANUT OIL CAKE is the residue after the extraction of part of the oil by pressure or solvents from peanut kernels.

PEANUT OIL MEAL is the ground residue after the extraction of part of the oil from peanut kernels.

UNHULLED PEANUT OIL FEED is the ground residue obtained after extraction of part of the oil from whole peanuts, and the ingredients shall be designated as "PEANUT MEAL AND HULLS."

The three new by-products referred to were studied by this Association and definitions given for the same. Recently it has come to our attention, and it has also been referred to this Association, of the presence of tin in certain grades of refuse middlings from the manufacture of tin plate. This difficulty is now being overcome by the use of magnets which takes out all particles of tin which might be present in the product. In order to be absolutely sure, however, that no harm can come from the feeding of this material, the Livestock Sanitary Board of our Department is conducting a feeding experiment with this feed. It would be well, at this time, to call your attention to the fact that one brand of so called refuse middlings was being sold which contained a large amount of ground peanut hulls, but as the law prohibits the sale of peanut hulls in any feed in the State, we have refused to permit this product to be sold, and therefore, if any of you gentlemen have any doubt as to the character of refuse middlings, it would be well to send samples to the Chief Chemist of the Department who will tell you whether or not any peanut hulls are found in it.

Owing to the damage caused to the oat crop during the year, much of this grain became damaged and in order that it could be sold in the trade, bleachings of the oats has been resorted to. From what we can learn no harm can come from the feeding of bleached oats although, of course, the oats are not of the same character as those which have not been damaged and it is claimed by some that the germination power of the oat is destroyed by bleaching.

I wish to call your attention also to the fact that some of the cottonseed meals being offered for sale this year, are not of as high a protein content as has usually been the case. This condition has been caused by the presence of more hulls in the meal than usual. It seems that because of the war abroad, there has been a big demand for lint which formerly brought about 2 cents per pound which now is being sold at about 7 cents per pound. This means that the manufacturers are cleaning all the lint they possibly can off the hulls which makes it difficult to separate as much of the hulls from the meal as could be done before the lint was removed. Where such meals are running low in protein, and contain excessive amount of cottonseed hulls, the Department has insisted that they be sold as a cotton seed feed. It would be well, when purchasing this product for you to have samples analyzed in our Laboratory, if you have any doubt that the guarantees will not be met.

A large proportion of the feed found on our markets consists of molasses feeds and chicken feeds. A claim is made by a reliable authority that at least 2 million tons of molasses feeds were sold in the United States last year. These feeds are of a better grade than have ever been sold before in the State and are improving from year to year. As is well known, they are made up of various by-products to which molasses has been added. In many cases the main ingredient used is grain screenings meal. This material is finely ground and pulverized until it resembles flour in its fineness and the pulverizing process destroys any whole weed seeds which might be present.

The chicken feeds, judging from the samples examined in our Laboratory, are of a better grade than ever before, as they do not appear to contain such quantities of weed seeds which the law prohibits. Many of these feeds are composed of the second and third grade cereal grains which are not used for making flour. The fact that the quality of the feeds being sold has improved, has made it unnecessary to bring but a few prosecutions during the last year. This situation is gratifying to us. From this information it will be apparent that this line of work which the Department is doing is of greater importance than usually can be realized or learned. It requires constant care on the part of our laboratory force to watch out for adulterants and violations and only scientific men carefully trained can be trusted with this work.

This brings me to a subject of vital importance to all those interested in this work, that is the needs of our Department for the proper enforcement of the Feeding Stuffs Law.

At the last session of the Legislature our appropriation for this work was reduced one-third of what we had been receiving and this reduction did not permit us to make any advancement forward in the line of special investigations and has made it impossible for us to investigate all cases properly where complaints are made. We are also called upon to show an exhibit of feeding stuffs to the various fairs, from time to time, and we have not been able to do this in all cases. It is highly desirable, therefore, that the appropriation for this work for the next fiscal period should be put back to its original amount. I call your attention to this matter in order that you may know of the situation and also as you may have an opportunity to help us out in this respect. We haven't examined quite as many samples of feeding stuffs last year as we did the previous year for the reason that the work was interrupted by moving the laboratories. The Board of Public Grounds and Buildings have fitted up a building in the Capitol Park Extension zone for the use of the laboratories of the Department and have moved the equipment from the Capitol to this building which makes it possible for all the chemical work of the Department to be done in a thorough and economical manner.

During the year our Special Agents collected 1,264 official samples of feeding stuffs which were submitted to the Chief Chemist for analysis. All of these samples were examined microscopically and analyzed for protein, fat and fiber and reports made to the manufacturers and the dealers from whom they were secured. In addition to this there were 225 special samples of feeding stuffs sent in for analysis by residents of the State.

The following is a list of the counties visited and the number of samples of feeds collected in each which I will not read at this time but which will be included in the published report. There were a number of towns visited in which no sample were secured as they represented brands, samples of which had been taken in other towns, however, we feel that the State was well covered during the year of inspection.

Name of County	No. of Samples
Adams,	4
Allegheny,	76
Armstrong,	13
Beaver,	35
Bedford,	18
Berks,	36
Blair,	36
Bradford,	24
Butler,	36
Cambria,	40
Cameron,	8
Centre,	16
Chester,	24
Clearfield,	26
Clinton,	13
Crawford,	26
Cumberland,	12
Dauphin,	24
Elk,	23
Erie,	34
Fayette,	26
Forest,	3
Huntingdon,	10
Indiana,	26
Jefferson,	36

Juniata,	8
Lackawanna,	12
Lancaster,	67
Lawrence,	13
Lebanon,	35
Luzerne,	48
Lycoming,	34
McKean,	28
Mercer,	16
Mifflin,	28
Montour,	8
Northumberland,	30
Perry,	2
Philadelphia,	10
Potter,	10
Somerset,	31
Susquehanna,	12
Tioga,	50
Union,	18
Venango,	21
Washington,	36
Westmoreland,	68
York,	44
Total,	1,264

I cannot complete this report without referring to the former Secretary of Agriculture, Hon. N. B. Critchfield, whose twelve years of service in the Department has been of much benefit and help to us all. Mr. Critchfield always took a special interest in the feeding stuffs work, going into all details of the matter and never left a hand unturned to do all that was possible for the betterment of the feed conditions in the State. In his resignation we lose his valuable advice and help in this line of work. However, his successor, Hon. Charles E. Patton our present Secretary, has also shown a great interest in this line of work and the former policies of the Department will be continued.

REPORT ON SOILS AND CROPS

By PROF. FRANKLIN MENGES

In last year's report we discussed the general methods of crop rotation follows throughout the State, and, in closing stated that in all sections of the State, crop rotation should be so arranged that advantage may be taken of cool weather cereal and leguminous crops in the higher and northern sections, and dry weather cereals and leguminous crops for the dry soils, and of the warm and hot weather cereals and leguminous crops for the warmer and hot areas of the State, so as to make crop rotations do what all rotations should do, namely, produce the largest amount of human nutrition and at the same time improve the soil permanently. A beginning has been made by the Bureau of Practical Agricultural Educational Work of the Department of Agriculture of the State along this line by introducing into the regular four year's rotation with every soil exhausting crop, a soil improving crop. This work was started three years ago in the northern part of York county on the mesozoic sandstone and shale soils on a farm which had been so reduced in fertility that the owner said to the writer that he could not get a renter for the place who would stay on it longer than a year. An examination of the soil revealed the fact that the organic matter had been so reduced that virtually all fertility for the growing crop had to be obtained from mineral sources because the humus still in the soil had changed into the inert condition and the quantity was so small that if it had been active humus it would have furnished but little fertility, and the soil was chemically inactive except for the little activity maintained by the commercial fertilizer applied annually, which is an activity not conducive to large crop yields, especially in sandy soils, and therefore the first and great thing to do was to devise a method for making humus on a soil which had to yield crops and where there was no manure, by raising soil improving crops with or following the soil exhausting crops.

This operation was started with the corn crop. A fertilizer composed of 1,200 pounds basic slag, 600 pounds 7% animal tankage and 200 pounds muriate of potash in the ton, was applied with the corn in the row at the rate of 200 pounds per acre, and before the last cultivation, Whippoorwill cowpeas, which had been inoculated with inoculating material from the Department of Agriculture at Washington, were sown in the corn at the rate of one bushel per acre and covering with the cultivator. The middle of September, when the corn had ripened, which, considering the condition of the soil, was a splendid crop, was cut and when husked yielded 90 baskets of ears per acre. The cowpea vines were in many instances more than two feet long with an average length of 18 inches, and covered the ground completely. As previously indicated, the soil was sandy and the cowpeas and corn stubble were cut up and mixed with the soil with a disk harrow by harrowing the ground three or four times. After the land had been prepared in this way, it was seeded with wheat, and with the wheat 200 pounds per acre of the same mixture of fertilizer as had been applied with the corn. The following spring, after the middle of April, inoculated hulled white blossom sweet clover seed was sown with the wheat at the rate of 3-4 quarts per acre and covered with a weeder. The seed came up and grew sufficiently tall that some tops were cut off when the wheat was harvested. The sweet clover was allowed to grow until the middle of August. When it had reached a height of 15 to 20 inches, it was plowed down and the land seeded with wheat again, and with the wheat the following spring, red and alsike clovers were sown, and in this way a soil improving crop was raised with every soil exhausting crop, or a soil exhausting crop followed with a soil improved crop in the old four years' rotation. As previously stated, a crop rotation should be so arranged that it will produce the largest amount of human food that can be produced in the individual soils and under prevailing climatic con ditions and under the management of each individual farmer, whether some phase of the livestock or semi-livestock and grain farming operation be followed or grain and hay forming or seed production which will, in the near future become a necessity in this State, or any other phase of agriculture or horticulture, and, in addition, improve the fertility of the soil. These are not easy things to do but can be done.

The livestock industry should, in a much larger way, be the prevailing agricultural industry of the State, and in order to make it more attractive financially, crops must be produced on the farm to feed the animals to get away from paying profits coming and going, and to do this, rotations established by means of which the largest amount of a high feeding value roughage and grain foods can be produced. A rotation for the southern part of the State which will furnish a large amount of a high feeding value roughage and at the same time improve the soil, can be arranged by seeding winter rye in the corn stubble in the fall of the year, and in the spring, as soon as the ground is sufficiently dry to run a weeder or a spike-tooth harrow over it, so with the rye equal quantities of red and mammoth clovers, the rye cut for hay or silage when it is heading, which, in the southern part of the State, will be early in May; allow the clover to grow until it is well headed, which will be sometime in July or August, cut for hay and allow the second crop to remain on the field. In this way two crops of high feeding value hay can be produced and one soil improving crop, all in one season. The following spring this clover sod is plowed down and the land prepared and planted with corn and the corn field of the previous year which had been sown with rye, used for the hay field, and in this way a farm can be divided into two fields, one for hay and the other for corn, and with the right use of the manure, the soil improved continuously.

An effort has been made to start this kind of work in a few sections of the State because of soil and climatic conditions being especially favorable; but a rotation which is more attractive to me than the above outline is now being practiced on a 300 acre farm by Martin Cope's son, Lancaster county. These people raise sweet corn which they dry and sell as their money crop. The husks and cobs are cut up and fed to cattle, and the corn stalks which, as all corn stalks do when the ears are plucked at the time they are in the best condition for drying, accumulate sugar in a few weeks until they contain as much as 12 to 14 per cent., when they are cut and either siloed or tied up in bundles and carefully dried and fed to cattle, furnishing approximately as rich a carbo-hydrate food as an ordinary corn crop. At the last cultivation of this corn, red and alsike clovers, alfalfa and timothy are sown with the corn, and the following year anywhere from 2 to 4 crops of hay are cut off this land; the first crop mixed hay made up of timothy, red and alsike clovers while the second and third crops are largely of alfalfa. These rotations furnish a large amount of roughage and corn but not a sufficient amount of high feeding value protein and grains, and therefore either part of the sod field must be planted in the southern section of the State with soy beans and in the central and northern part with Canada field peas, or part of the field seeded for hay must be used for raising these crops.

It may be well to state that one bushel of soy beans ground with two bushels of corn will make a splendid grain ration for dairy cows, but it is likely that with well nigh all farmers throughout the larger part of the State, the longer rotations such as the three years for the central and northern and higher areas made up of corn followed with Canada field peas and oats, and the Canada field peas and oats with clovers and, wherever possible, alfalfa, and in the southeastern sections, a rotation of corn, soy beans and, in some sections, cow peas and alfalfa, will prevail for a long time.

As previously stated, the raising of clean, pure seed of good vitality has become a question of supreme importance in the State and through the introduction of shorter rotation, this demand will be much enlarged, which, with a large acreage of sandy, loamy, warm late fall and early spring farming soils splendidly adapted for raising fall or early summer ripening crops, such as crimson clover, followed with a dry hot weather early fall ripening crop such as the cowpea and sweet clover, and in the more loamy soils, with soy beans for seed, this demand can be supplied and the land continually improved. Rotations of this character have been outlined and started in a small way on the sandy and shaly soils derived from the Clinton strata in Juniata county.

MARKETING

By E. B. DORSETT

Mr. Chairman and Members of the Board and Fellow Workers: I deem it an honor and a privilege to address this intelligent body; but naturally I shrink from taking the place of a man of such prominence as Congressman Lever. As has been stated by your Chairman, in all these meetings, thus far, the one problem that seems to be bothering you is, that of better market facilities. I am satisfied that there is no problem confronting the farmer today that is of such vital importance to him as adequate marketing facilities. I would not in the least discourage the increased production that we hear about, but I am firmly convinced that the farmer is not so much worried today about producing the crop as he is about marketing it after it has been produced, and I believe that the greatest problem that confronts you today is, "How Can I Get That Product to Market At The Least Expense and Get The Most Out of It?" I know that we have many remedies, many solutions of this great problem, and I know that there are many theories and there is much criticism, but I want to say to you, fellow farmers and members of the Board, that it is much easier to criticise than it is to bring forth a definite plan of action. We have what might be called two forms of criticism, constructive and destructive, and we have plenty of men who are long on destructive and short on constructive criticism. We have plenty of men who can tear down, but we do not have men enough who can build up. It takes more brains to build up than it does to tear down, and I think that Lincoln hit the nail squarely on the head when he said that before one tears down the house which one has built, he must first build one for himself; and so in this great problem of marketing, it requires the earnest co-operation of all agencies interested in the uplift of agriculture.

I want to call your attention right here to one fact that has cropped out here at this meeting and has found its way into the columns of the newspapers about the overlapping of interests. It is not for me here to say where it came from or who is back of it, but I want to say this to you, that we cannot afford, as men interested in agriculture, to allow any outside interest to keep us apart. (Applause) Some years ago, down in the south, when that great Civil War was going on, a great general met one of the colored gentlemen one day and he said, "Sambo, why is it that you are not at the front fighting? Do you not know that this war is for you?" Sambo looked at him a moment, then he said, "Massa, when two dogs fight over a bone, the bone don't fight." (Laughter) Now that is the situation in Pennsylvania today; if we are going to do anything along the line of marketing, we must have thorough co-operation. But I haven't time this afternoon to cover this field as I would like, and I did not know, until noon, that I was to say anything on this subject, and fortunately for you and unfortunately for me, I have not had time to prepare a manuscript or even notes; but I want to say to you that there are three great factors that we need as farmers and as men interested in agriculture. The first is organization, the second is education and the third is co-operation.

ORGANIZATION

With these three great factors at work, I want to say to you that we can cover the field thoroughly. Now, in just touching on the first, that of organization, I want to say to you that no great achievement has ever been accomplished save through organization. You can see that here with this Board of Agriculture. Follow its history from its birth down to this day and note its achievements. It is a striking example of what you can do by thorough organization. Then, again, I would call your attention to the fact that in these organizations they ought not to cover too wide a territory; they should be local, to start with. We are reading much in these days, and hearing more, about community centers and community interests.

Well, that is only another form of organization. Now that organization may take whatever form you are pleased to follow. It may be the grange, it may be the farmers' club or the farmers' union, or it may be just a little handful of farmers; but remember that the first thing you must do is to *organize*. That is the thought that I want to leave with you and I want to pound it in so hard that you will not forget it. Why, some years ago when P. T. Barnum was at his desk, as the people came out of that tent one afternoon at the close of one of his afternoon performances, they came along the side of a smaller tent and there they saw and heard one of those barkers, as they were called and he was proclaiming, in a loud tone of voice, that for a dime, ten cents, a tenth part of a dollar, they could go inside and see what no man, woman or child had ever seen before. They quickly parted with their dimes and went in and the tent was finally filled to overflowing and then they commenced to come out and they called that man an imposter. Why, they said "There is nothing in that tent." He said, "Wait a minute." He went inside and hauled back a curtain and there, sitting on a plank, were six farmers and they had hold of a rope and they were all pulling together, the other end being fastened to the center pole of the tent. He said, "There, ladies and gentlemen, is something that no man, woman or child ever saw before, six farmers pulling together." (Applause and laughter). Now that is the keynote of marketing, pulling together. I would like to see this State Board pull together as a unit in the great work of uplifting agriculture.

EDUCATION

Now the second point I want to make is that of education, and I shall not refer to the kind that you would ordinarily expect to get in college, but rather that which you would get from the University of hard-knocks. That is the kind of education that most of us have and that is the kind of education that sticks, and I want to say to you that the very best education a man, woman or child can get is that which teaches him or her how to work. Why, someone has said, "God help the rich, the poor can work;" and I believe that this is the real salvation of this country today that so many of us know how to work, and the best thing that could happen to agriculture today would be to have more young men and more young women on the farm who know how to work.

Now the education that I refer to today is that which acquaints the farmer with the needs of the market. I discovered yesterday, by listening to the remarks that were made here, that even though some of you have been engaged in a certain line of agriculture for a number of months, that you have not yet learned the needs of the market and that the great question, one which requires considerable education, and you know the allegation is often made, and I resent it with all my heart and all my soul, the allegation is often made that the farmer is not a business man. I want to say to you that you may go where you will over Pennsylvania or throughout the length and breadth of this country, and you will find that the best and the brainest men are men from the farm. Go into the great banking institutions of Philadelphia or New York and you will find that 90% of them were men from the farm. They are business men, but unfortunately many of them do not have time to study the science of selling their products, and that is where a great many of them fail, they do not understand how to get their product to the market in the best form and at the least expense, and I believe that the Department of Agriculture could do no greater service to you farmers and to agriculture in general today than to give the farmer some assistance along the line of grading, packing and salting.

Just let me relate one or two experiences I have had which cover this point: I think it was two years ago, nearly two years ago, that I was in one of the western counties of Pennsylvania where they ship a great deal of hay, and those farmers thought they were not getting enough for that hay. Well, I said, "Do you want to ship it direct to the market?" And they said, "Yes." I said, "All right, I'll tell you where to ship it;" and then I said to them: "Now you have several grades of hay, and not many of you have had any experience in the grading of that hay, but so far as you can, order two or three cars, and then when you farmers take that hay to the market or to the station, sort it as nearly as your knowledge will permit, putting only one grade in a car;" and those farmers followed out the instructions given them, and they told me afterward that they received $7. more a ton for that hay than they could have gotten at home. Just last week, at the close of the Institute in Mercer county, a young man came to me at the close of the Institute and said, "Do you remember telling me about shipping some hay?" I said, "Yes, sir." "Well," he said, "I saved $7. on a single car." Now that is the kind of marketing that touches the farmers' heart. Why, do you know someone has said that "he who makes two blades of grass where but one grew before is a benefactor to mankind." I want to say to you that he who can bring two smiles where none grew before is a greater benefactor, and there is nothing that will make a farmer smile more widely than to give him a good price for what he produces, and he is not so much concerned today about the production of that extra blade of grass as he is as to who will get it after it is produced. That is the big problem in this business.

Now another illustration to show you what I mean; some of you are engaged in the growing of potatoes; I know there are some here from counties that produce many thousand of bushels, and the one thing that has kept you out of the best markets has been the fact that the potatoes often have not been thoroughly graded. The potatoes as they usually come from the ground ought to be graded into three grades, and yet the common practice is, with many farmers, to simply sort out the little ones as they are called, and then put them all in one grade; yet I know of instances over in New York City, where they are paying 10 and 15 cents more a bushel for potatoes of a certain grade than they are paying where they are shipped practically as they come from the ground.

The question of fruit marketing was touched upon here yesterday. Why, farmers, do you know that it costs 55 cents a bushel to get the apples of the West to our market? Now is it possible that you let some fellow way out on the western coast pay that additional charge and compete with you? You know and I know that you can grow the finest apples in the world right here in Pennsylvania, and what is the difference? Why, just let me call your attention to this; when a man orders a box or 50 boxes or 100 boxes of Spitzenburg apples from the West, he knows that every box will be like the other box; he does not buy them by inspection, but he buys by reputation; but you let some one come into the market where many of our apples are sold and instead of taking your word or the word of the dealer they must see them; and that is not all, they must handle them, and many times handle them until they are bruised and unfit for the market, and that is the method that is being employed in too many instances here in Pennsylvania. Now then we need to have, as has been suggested, and here again comes in your organization—I would like to see all the different horticultural societies of Pennsylvania just tied up in one organization, have one trade mark and one stamp, and when they put on a barrel or a box of apples, it means something, just the same as it does when they come from the west. Why, we farmers have as many brands, as the western farmers have, and why can't we use them? And I believe that the time is coming when we will use them.

Another thing—I call your attention to along this line of education is the fact that oftentimes we dont know when and where to ship. That is a serious obstacle, and here again I believe that the Department of Agriculture can be of great assistance to us in this work. We should have on file at the Department at all times information that will enable you farmers to know where and when to ship. Why, you know it is a crime to ship products to one market until it is glutted to that extent that they must take the apples or the potatoes or the tomatoes or whatever it may be, out and dump them into the river or the ocean. That condition ought not to obtain, and if we had adequate marketing facilities and the right kind of information, it would not obtain. There is just as much in knowing where and when to ship as there is in producing the crop. We hear much about supply and demand and undoubtedly that affects market prices, but our marketing has been dump and demand, and I want to stop it. Why, the farmers today are planting and sowing by faith, and they reap in hope and they market by accident; and they have been doing that right along, and now let us see if we cannot adopt a better method, let us see if we cannot, by working together, work out a problem that will give to each man an honest share of what the harvest yields. I am a firm believer in giving the producer of any commodity an honest price for what he produces. I think if there is anybody that ought to have the profit, it is the man who produces it and not the man who hands it over to somebody else; all toil, if it is honorable, should bring some recompense, and if we need assistance in this work and men to give valuable aid, then they are entitled, then they are entitled to some pay, but we can work out a system whereby we can eliminate a lot of unnecessary so-called middle men.

Now a great deal has been said about the middlemen and I am not here this afternoon to make any cry against them. I want to say that the system is wrong and not the men, and what we need is a different system of marketing, and when we have that, we will not need to worry about the middleman, he will be taken care of all right, and with a system along the line that I have suggested, I am sure that we will help solve this problem.

One other thought comes to me, to show you the need of having this information; I think it was two years ago last August that I was in York county in a community where they raised a great many potatoes, and, as I remarked, it was about the third of August. I was at a little railroad station, I have forgotten the name of it, the farmers were loading potatoes and I went out into the car where they were loading them and asked one of the men what he was getting for his potatoes, and he told me 50 cents a bushel, and I said "Where are you shipping them?" And he said "To Baltimore." Well, I said "You will excuse me, but could you not find a better market than Baltimore at this time of the year?" "Well," he said, "Why?" "Why," I said, "Don't you know that they have potatoes in Baltimore weeks ago and they have plenty of them today? Why not ship these potatoes north where they haven't yet come into the market? When I left my home yesterday morning, potatoes not as good as these were bringing $1.25 a bushel." Now, do you catch the thought? Instead of shipping those potatoes south, they should have shipped them north What would have been the result? Why, the farmers of York county would have gotten more for their products and the consumer at the other end of the line would have paid less, and that is true co-operation. That is the kind of co-operation that you and I ought to be most vitally interested in, that which helps us all, and I would have you remember, farmers, that when you reach out your hand and help your brother, you are bound to help yourself.

CO-OPERATION

The last point that I would touch upon is that of co-operation and, lest some fellow might misunderstand me, I want to give you a definition of co-operation, "Do unto others as you would be done by." Now I think that most of you can tell where that is found. If you cannot, I hope you will hunt it up, but I believe the one thing that has kept farmers from co-operating has been the fact that they have not been willing to follow out that law. When we reach the point where we are willing that the other fellow shall get his share, then we are in a position to do some thorough co-operation.

Now, in conclusion, I would like to urge you farmers, when you go back home, and the members of this Board and the Institute workers, to think over this problem and, having thought over it, if you have any thoughts along the line of helpfulness, I wish you would take the Secretary at his word yesterday and either see him personally or write him what your thoughts are. This is a work in which we can all help and one in which we are all vitally interested. Let us see if we cannot, during the next two years or during the next year, work out a system of marketing such as no state in the Union has ever seen. I believe we can do it. I believe that with the experience that we have gained along this line, we can make it possible for farmers to not only produce more but get more for what they produce.

I was interested while up in Mercer county to find that the National Government, under the auspices of the Department of Agriculture, was giving the farmers there an interesting lesson in what can be done by way of selling the dairy products. They have leased there a creamery, I believe for 15 years, and the manager of that creamery came before one of our Institutes and gave us a summary of the first year's work, and he showed us that the Government, by running that creamery, was giving the farmer a much better price for the milk from his herds than he had ever received before, and that the creamery cut down the expense and by doing that we are going to solve this great problem. If I had time, but I will not take more of it, I would like totalk to you more about what has been done in co-operating here in Pennsylvania. I could tell you of some things where the farmers—of some instances where the farmers have not only saved money, but they have learned the lesson of putting their products on the market in a form that makes them attractive, and that, I believe, is the solution to the problem of the high cost of living. Now let us go back to our several homes and take up this along with other problems and study them from the standpoint of our interest, and if we do that we will take into consideration all other interests because all interests are dependent upon agriculture and the farmers' success. I thank you for your attention. (Applause).

APPENDIX

APPENDIX

List of Publications of the Pennsylvania Department of Agriculture

ANNUAL REPORTS

*Report of the State Board of Agriculture, 336 pages, 1877.
*Report of the State Board of Agriculture, 625 pages, 1878.
*Report of the State Board of Agriculture, 560 pages, 1879.
*Report of the State Board of Agriculture, 557 pages, 1880.
*Report of the State Board of Agriculture, 646 pages, 1881.
*Report of the State Board of Agriculture, 645 pages, 1882.
*Report of the State Board of Agriculture, 645 pages, 1883.
*Report of the State Board of Agriculture, 648 pages, 1884.
*Report of the State Board of Agriculture, 645 pages, 1885.
*Report of the State Board of Agriculture, 646 pages, 1886.
*Report of the State Board of Agriculture, 650 pages, 1887.
*Report of the State Board of Agriculture, 648 pages, 1888.
*Report of the State Board of Agriculture, 650 pages, 1889.
*Report of the State Board of Agriculture, 594 pages, 1890.
*Report of the State Board of Agriculture, 600 pages, 1891.
*Report of the State Board of Agriculture, 640 pages, 1892.
*Report of the State Board of Agriculture, 713 pages, 1893.
*Report of the State Board of Agriculture, 646 pages, 1894.
*Report of the Department of Agriculture, 878 pages, 1895.
*Report of the Department of Agriculture, Part 1, 820 pages, 1896.
*Report of the Department of Agriculture, Part 2, 444 pages, 1896.
*Report of the Department of Agriculture, Part 1, 897 pages, 1897.
*Report of the Department of Agriculture, Part 2, 309 pages, 1897.
*Report of the Department of Agriculture, 894 pages, 1898.
*Report of the Department of Agriculture, Part 1, 1082 pages, 1899.
*Report of the Department of Agriculture, Part 2, 368 pages, 1899.
*Report of the Department of Agriculture, Part 1, 1010 pages, 1900.
*Report of the Department of Agriculture, Part 2, 348 pages, 1900.
*Report of the Department of Agriculture, Part 1, 1040 pages, 1901.
*Report of the Department of Agriculture, Part 2, 464 pages, 1901.
*Report of the Department of Agriculture, Part 2, 324 pages, 1902.
*Report of the Department of Agriculture, 958 pages, 1903.
*Report of the Department of Agriculture, 790 pages, 1904.
*Report of the Department of Agriculture, 846 pages, 1905.
*Report of the Department of Agriculture, 690 pages, 1906.
*Report of the Department of Agriculture, 565 pages, 1907.
*Report of the Department of Agriculture, 690 pages, 1908.
Report of the Department of Agriculture, 806 pages, 1909.
Report of the Department of Agriculture, 714 pages, 1910.
Report of the Department of Agriculture, 694 pages, 1911.
Report of the Department of Agriculture, 558 pages, 1912.
*Report of the Department of Agriculture, 684 pages, 1913.
*Report of the Department of Agriculture, 468 pages, 1914.
Report of the Department of Agriculture, 542 pages, 1915.

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*Edition exhausted.

BULLETINS

No. 1.* Tabulated Analyses of Commercial Fertilizers, 24 pages, 1895.
No. 2.* List of Lecturers of Farmers' Institutes, 36 pages, 1895.
No. 3.* The Pure Food Question in Pennsylvania, 38 pages, 1895.
No. 4.* Tabulated Analyses of Commercial Fertilizers, 22 pages, 1896.
No. 5.* Tabulated Analyses of Commercial Fertilizers, 38 pages, 1896.
No. 6.* Taxidermy: How to Collect Skins, etc., 128 pages, 1896.
No. 7.* List of Creameries in Pennsylvania, 68 pages, 1896.
No. 8.* Report of State Horticultural Association, 108 pages, 1896.
No. 9.* Report of Dairymen's Association, 96 pages, 1896.
No. 10.* Prepared Food for Invalids and Infants, 12 pages, 1896.
No. 11.* Tabulated Analyses of Commercial Fertilizers, 22 pages, 1896.
No. 12.* Road Laws for Pennsylvania, 42 pages, 1896.
No. 13.* Report of Butter Colors, 8 pages, 1896.
No. 14.* Farmers' Institutes in Pennsylvania, 92 pages, 1896.
No. 15.* Good Roads for Pennsylvania, 42 pages, 1896.
No. 16.* Dairy Feeding as Practiced in Pennsylvania, 126 pages, 1896.
No. 17.* Diseases and Enemies of Poultry, 128 pages, 1896.
No. 18.* Digest of the General and Special Road Laws for Pennsylvania, 130 pages, 1896.
No. 19.* Tabulated Analyses of Commercial Fertilizers, 40 pages, 1896.
No. 20.* Preliminary Report of Secretary, 126 pages, 1896.
No. 21.* The Township High School, 24 pages, 1897.
No. 22.* Cider Vinegar of Pennsylvania, 28 pages, 1897.
No. 23.* Tabulated Analyses of Commercial Fertilizers, 31 pages, 1897.
No. 24.* Pure Food and Dairy Laws of Pennsylvania, 19 pages, 1897.
No. 25.* Farmers' Institutes in Pennsylvania, 8 pages, 1897.
No. 26.* Farmers' Institutes in Pennsylvania, 74 pages, 1897.
No. 27.* The Cultivation of American Ginseng, 23 pages, 1897.
No. 28.* The Fungous Foes of the Farmer, 19 pages, 1897.
No. 29.* Investigation in the Bark of Trees, 17 pages, 1897.
No. 30.* Sex in Plants, 17 pages, 1897.
No. 31.* The Economic Side of the Mole, 42 pages, 1898.
No. 32.* Pure Food and Dairy Laws, 30 pages, 1898.
No. 33.* Tabulated Analyses of Commercial Fertilizers, 42 pages, 1898.
No. 34.* Preliminary Report of the Secretary, 150 pages, 1898.
No. 35.* Veterinary Medicines, 23 pages, 1898.
No. 36.* Constitutions and By-Laws, 73 pages, 1898.
No. 37.* Tabulated Analyses of Commercial Fertilizers, 40 pages, 1898.
No. 38.* Farmers' Institutes in Pennsylvania, 8 pages, 1898.
No. 39.* Farmers' Institutes in Pennsylvania, 88 pages, 1898.
No. 40.* Questions and Answers, 206 pages, 1898.
No. 41.* Preliminary Reports of the Department, 189 pages, 1899.
No. 42.* List of Creameries in Pennsylvania, 88 pages, 1899.
No. 43. The San Jose Scale and other Scale Insects, 22 pages, 1899.
No. 44.* Tabulated Analyses of Commercial Fertilizers, 62 pages, 1899.
No. 45. Some Harmful Household Insects, 13 pages, 1899.
No. 46.* Some Insects Injurious to Wheat, 24 pages, 1899.
No. 47.* Some Insects Attacking Fruits, etc., 19 pages, 1899.
No. 48.* Common Cabbage Insects, 14 pages, 1899.
No. 49. Methods of Protecting Crops, etc., 20 pages, 1899.
No. 50.* Pure Food and Dairy Laws of Pennsylvania, 33 pages, 1899.
No. 51.* Tabulated Analyses of Commercial Fertilizers, 69 pages, 1899.
No. 52.* Proceedings Spring Meeting of Round-up Meeting, Farmers' Institute Managers, etc., 296 pages, 1899.
No. 53.* Farmers' Institutes in Pennsylvania, 1899-1900, 94 pages, 1899.
No. 54.* Tabulated Analyses of Commercial Fertilizers, 163 pages, 1899.
No. 55. The Composition and Use of Fertilizers, 126 pages, 1899.
No. 56. Nursery Fumigation and the Construction and Management of the Fumigating House, 24 pages, 1899.
No. 57. The Application of Acetylene Illumination to Country Homes, 85 pages, 1899.
No. 58. The Chemical Study of the Apple and Its Products, 44 pages, 1899.
No. 59. Fungous Foes of Vegetable Fruits, 39 pages, 1899.
No. 60.* List of Creameries in Pennsylvania, 33 pages, 1899.
No. 61.* The Use of Lime in Pennsylvania Soils, 170 pages, 1900.
No. 62. A Summer's Work Abroad in School Grounds, Home Grounds, Play Grounds, Parks and Forests, 34 pages, 1900.
No. 63. A Course in Nature Study for Use in the Public Schools, 119 pages, 1900.
No. 64. Nature Study Reference Library for Use in the Public Schools, 22 pages, 1900.
No. 65. Farmers' Library List, 29 pages, 1900.
No. 66.* Pennsylvania Road Statistics, 98 pages, 1900.

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*Edition not for general distribution.

No. 67. Methods of Steer Feeding, 14 pages, 1900.
No. 68.* Farmers' Institutes in Pennsylvania, 90 pages, 1900.
No. 69.* Road Making Materials of Pennsylvania, 104 pages, 1900.
No. 79.* Tabulated Analyses of Commercial Fertilizers, 97 pages, 1900.
No. 71. Consolidation of Country Schools and the Transportation of Scholars by use of Vans, 89 pages, 1900.
No. 72.* Tabulated Analyses of Commercial Fertilizers, 170 pages, 1900.
No. 73. Synopsis of the Tax Laws of Pennsylvania, 132 pages, 1901.
No. 74.* The Repression of Tuberculosis of Cattle by Sanitation, 24 pages, 1901.
No. 75.* Tuberculosis of Cattle, and the Pennsylvania Plan for its Repression, 263 pages, 1901.
No. 76. Co-operative Investigation into the Agricultural Seed Supply of Pennsylvania, 50 pages, 1901.
No. 71.* Bee Culture, 101 pages, 1901.
No. 78.* List of County and Local Agricultural Societies, 10 pages, 1901.
No. 79. Rabies, 28 pages, 1901.
No. 80.* Decisions of the Department of Agriculture on the Pure Food Act of 1895, 30 pages, 1901.
No. 81. Concentrated Commercial Feeding Stuffs in Pennsylvania, 136 pages, 1901.
No. 82.* Containing the Law Creating a Department of Agriculture in Pennsylvania, and giving the Various Acts of Assembly Committed to the Department for Enforcement: Together with Decisions and Standards Adopted with Reference to the Pure Food Act of 1895, 90 pages, 1901.
No. 83.* Tabulated Analyses of Commercial Fertilizers, 132 pages, 1901.
No. 84. Methods of Steer Feeding; the Second Year of Co-operative Experiment by the Pennsylvania State Department of Agriculture and the Pennsylvania State College Agricultural Experiment Station, 16 pages, 1901.
No. 85.* Farmers' Institutes of Pennsylvania, 102 pages, 1901.
No. 86.* Containing a Complete List of Licenses granted by the Dairy and Food Commissioner, from January 1, 1901, to July 1, 1901, etc., 422 pages, 1901.
No. 87.* Giving Average Composition of Feeding Stuffs, 42 pages, 1901.
No. 88.* List of Creameries in Pennsylvania, 33 pages, 1901.
No. 89.* Tabulated Analyses of Commercial Fertilizers, 195 pages, 1901.
No. 90. Treatment of San Jose Scale in Orchard and Nursery, 33 pages, 1902.
No. 91. Canning of Fruits and Vegetables, 57 pages, 1902.
No. 92.* List of Licenses Granted by the Dairy and Food Commissioner, 193 pages, 1902.
No. 93.* The Fundamentals of Spraying, 35 pages, 1902.
No. 94. Phosphates—Phosphatic or Phosphoric Acid Fertilizers, 87 pages, 1902.
No. 95.* County and Local Agricultural Societies, 12 pages, 190) 2.
No. 96. Insects Injurious to Cucurbitaceous Plants, 31 pages, 1903.
No. 97. The Management of Greenhouses, 41 pages, 1902.
No. 98. Bacteria of the Soil in Relation to Agriculture, 88 pages, 1902.
No. 99. Some Common Insect Pests of the Farmer, 32 pages, 1902.
No. 100.* Containing Statement of Work of Dairy and Food Division from January 1, 1902, to June 30, 1902, 233 pages, 1902.
No. 101.* Tabulated Analyses of Commercial Fertilizers, 137 pages, 1902.
No. 102. The Natural Improvement of Soils, 50 pages, 1902.
No. 103.* List of Farmers' Institutes of Pennsylvania, 67 pages, 1902.
No. 104. Modern Dairy Science and Practice, 127 pages, 1902.
No. 105.* Potato Culture, 96 pages, 1902.
No. 106. The Varieties of Fruit that can be Profitably Grown in Pennsylvania, 50 pages, 1902.
No. 107.* Analyses of Concentrated Commercial Feeding Stuffs, 62 pages, 1903.
No. 108. The Hessian Fly (never printed).
No. 109.* Tabulated Analyses of Commercial Fertilizers, 208 pages, 1903.
No. 110.* Containing Statement of Work of Dairy and Food Division from July 1, to December 31, 1903, 248 pages, 1903.
No. 111.* Small Fruits, Their Origin, Culture and Marketing, 66 pages, 1903.
No. 112.* List of County and Local Agricultural Societies, 10 pages, 1903.
No. 113. Methods of Milking, 96 pages, 1903.
No. 114.* Tabulated Analyses of Commercial Fertilizers, 116 pages, 1903.
No. 115. Proceedings of Annual Meeting of Farmers' Institute Managers and Lecturers, 210 pages, 1903.
No. 116.* Farmers' Institutes in Pennsylvania, Season of 1903-1904, 64 pages, 1903.
No. 117.Potash Fertilizers—Sources and Methods of Application, 46 pages, 1903.
No. 118.* Containing the Laws Creating the Office of Dairy and Food Commissioner in Pennsylvania, and also a Digest of the Act of Assembly Committed to his Administration 62 pages, 1903.
No. 119.* Tabulated Analyses of Commercial Fertilizers, 115 pages, 1903.

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No. 120. The Apple-tree Tent-caterpillar, 46 pages, 1903.
No. 121. Address of Hon. Joseph W. Hunter, State Highway Commissioner, Delivered at Annual Meeting of State Board of Agriculture, January 28, 1904, 16 pages, 1903.
No. 122.* Analyses of Concentrated Commercial Feeding Stuffs, 52 pages, 1904.
No. 123.* Chestnut Culture, 50 pages, 1904.
No. 124.* County and Local Agricultural Fairs, 10 pages, 1904.
No. 125. The Source and Nature of Bacteria in Milk, 41 pages, 1904.
No. 126.* Tabulated Analyses of Commercial Fertilizers, January 1, to August 1, 140 pages, 1904.
No. 127.* Farmers' Institutes in Pennsylvania, 71 pages, 1904.
No. 128. Grape Culture, 62 pages, 1904.
No. 129. Alfalfa Culture in Humid Land, 64 pages, 1904.
No. 130. The Cow-pea in the North, 41 pages, 1904.
No. 131. Proceedings, State Board of Agriculture and Farmers' Normal Institute, 260 pages, 1904.
No. 132.* Analyses of Commercial Fertilizers, August 1, to December 31, 70 pages, 1904.
No. 133. The Improvement of Corn in Pennsylvania, 76 pages, 1904.
No. 134. Proceedings of the Twenty-eighth Annual Meeting of the State Board of Agriculture, 152 pages, 1905.
No. 135.* Analyses of Concentrated Feeding Stuffs, 41 pages, 1905.
No. 136.* List of County and Local Agricultural Societies, 8 pages, 1905.
No. 137. Proceedings, Spring Meeting State Board of Agriculture and Farmers' Annual Normal Institute, 216 pages, 1905.
No. 138.* Analyses Concentrated Commercial Fertilizers, January 1, to August 1, 106 pages, 1905.
No. 139.* Farmers' Institutes in Pennsylvania, 1905-1906, 93 pages, 1905.
No. 140. Sheep Husbandry, 69 pages, 1905.
No. 141.* Laws Relating to the Dairy and Food Division, 47 pages, 1905.
No. 142.* Analyses Concentrated Commercial Fertilizers, August 1, to December 31, 61 pages, 1905.
No. 143. Poultry in Pennsylvania, 36 pages, 1906.
No. 144. Proceedings of 29th Annual Meeting State Board of Agriculture, 191 pages, 1906.
No. 145.* Commercial Feeding Stuffs in Pennsylvania, 51 pages, 1906.
No. 146.* List of County and Local Agricultural Societies, 10 pages, 1906.
No. 147. Market Gardening, 53 pages, 1906.
No. 148. Report of Bee-Keepers' Association of Pennsylvania, 57 pages, 1906.
No. 149.* Analyses Commercial Fertilizers, January 1, August 1, 1906, 80 pages, 1906.
No. 150.* Farmers' Institutes in Pennsylvania, for the year 1906-1907, 73 pages, 1906.
No. 151. Proceedings Spring Meeting of State Board of Agriculture and Farmers' Annual Normal Institute, 190 pages, 1906.
No. 152. Fruits of Pennsylvania, 330 pages, 1906.
No. 153.* Analyses Commercial Fertilizers, August 1, December 31, 1906, 60 pages, 1906.
No. 154. Proceedings State Board of Agriculture for 1907, 158 pages, 1907.
No. 155.* Commercial Feeding Stuffs of Pennsylvania for 1906, 47 pages, 1907.
No. 156.* List of County and Agricultural Fairs for 1907, 10 pages, 1907.
No. 157. Proceedings of Farmers' Normal Institute and State Board of Agriculture, 210 pages, 1907.
No. 158.* Farmers' Institute for year 1907-1908, 78 pages, 1907.
No. 159.* Analyses of Commercial Fertilizers of Spring Samples, 69 pages, 1907.
No. 160.* Laws Relating to Dairy and Food Division, 69 pages, 1907.
No. 161. Papers Read at Farmers' Institutes, 1906-1907, 124 pages, 1907.
No. 162. Breakfast Foods, 40 pages, 1907.
No. 163.* Analyses of Commercial Fertilizers from Fall Samples, 51 pages, 1907.
No. 164. Proceedings State Board of Agriculture, 1908, 210 pages, 1908.
No. 165.* Lists of County and Agricultural Fairs, 1908, 10 pages, 1908.
No. 166. Results of the Analyses of Paris Green, 6 pages, 1908.
No. 167.* Analyses of Commercial Feeding Stuffs, for 1907, 98 pages, 1908.
No. 168.* Preliminary Report Dairy and Food Commissioner, 50 pages, 1908.
No. 169. Proceedings Spring Meeting State Board of Agriculture and Annual Farmers' Normal Institute, 214 pages, 1908.
No. 170.* Farmers' Institutes for Season of 1908, 84 pages, 1908.
No. 171. Analyses of Commercial Fertilizers, January 1, to August 1, 1008, 74 pages, 1908.
No. 172. The Bang Method for the Repression of Tuberculosis in Cattle, 28 pages, 1908.
No. 173.* Analyses of Commercial Fertilizers, August 1, to December 31, 1908, 58 pages, 1908.
No. 174.* List of Fertilizer Manufacturers, 1909, 32 pages, 1909.
No. 175.* Analyses of Commercial Feeding Stuffs, 1908, 148 pages, 1909.
No. 176. Analyses of Paris Green, 1908, 31 pages, 1909.

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*Edition not for general distribution.

No. 177. Proceedings State Board of Agriculture, 180 pages, 1909
No. 178.* List of County and Local Agriculture Fairs, 10 pages, 1909.
No. 179. Papers Read at Farmers' Institutes, 1907-1908, 105 pages, 1909.
No. 180.* Laws Dairy and Food Bureau, 69 pages, 1909.
No. 181. Timely Hints to Horsebreeders, 23 pages, 1909.
No. 182. Proceedings Farmers' Annual Normal Institute and Spring Meeting State Board of Agriculture, 231 pages, 1909.
No. 183.* Report of Dairy and Food Bureau, 57 pages, 1909.
No. 184. Farmers' Institutes for Pennsylvania, 1909, 79 pages, 1909.
No. 185.* Analyses of Commercial Fertilizers, January 1, to August 1, 1909, 87 pages, 1909.
No. 186.* Swine Husbandry, 127 pages, 1909.
No. 187. Directory of Stallions Registered with Pennsylvania Livestock Sanitary Board, for 1909, 86 pages, 1909.
No. 188. Principles of Domestic Science, 42 pages, 1909.
No. 189.* Analyses of Commercial Fertilizers, August 1, to December 31, 1909, 71 pages, 1909.
No. 190. The Potato: Selection of Seed and Cultivation, 62 pages, 1910.
No. 191.* List of Fertilizer Manufacturers and Brands Licensed for 1910, 38 pages, 1910.
No. 192. Analyses of Paris Green for 1909, 38 pages, 1910.
No. 193. Proceedings Thirty-third Annual Meeting State Board of Agriculture, 192 pages, 1910.
No. 194.* Preliminary Report, Dairy and Food Commissioner, 40 pages, 1910.
No. 195.* List of Agricultural Fairs for 1910, 10 pages, 1910.
No. 196. Commercial Feeding Stuffs of Pennsylvania for 1909, 186 pages, 1910.
No. 197. Proceedings Farmers' Annual Normal Institute and Spring Meeting of Board of Agriculture, 260 pages, 1910.
No. 198.* Farmers' Institutes in Pennsylvania, Season 1910-1911, 84 pages, 1910.
No. 199* Tabulated Analyses of Commercial Fertilizers, Spring Samples, 72 pages, 1910.
No. 200. Skim-milk Cheese, 16 pages, 1910.
No. 201. Market Gardening, No. 2, 86 pages, 1910.
No. 202. Marketing Horticultural Products, 86 pages, 1910.
No. 203.* Tabulated Analyses of Commercial Fertilizers, Fall Samples, 76 pages, 1910.
No. 204. Analyses of Paris Green, 1910, 34 pages, 1910.
No. 205.* List Fertilizer Manufacturers, 37 pages, 1911.
No. 206.* Preliminary Report Dairy and Food Bureau, 37 pages, 1911.
No. 207.* List County Fairs, 10 pages, 1911.
No. 208.* Analyses Commercial Feeding Stuffs, 213 pages, 1911.
No. 209.* Laws, Dairy and Food Bureau, 72 pages, 1911.
No. 210. Proceedings State Board of Agriculture, 208 pages, 1911.
No. 211. Report of Foot-and-Mouth Disease, (Aphthous Fever), 72 pages, 1911.
No. 212.* Analyses Commercial Fertilizers, (Spring), 11 pages, 1911.
No. 213. Proceedings Annual Normal Institute, 235 pages, 1911.
No. 214.* Schedule Farmers' Institutes, 1911-1912, 82 pages, 1911.
No. 215. List of Publications on Fruit Growing, 23 pages, 1911.
No. 216. Cheap Candy, 21 pages, 1911.
No. 217. Grape Culture for Pennsylvania, 66 pages, 1911.
No .218.* Analyses Commercial Fertilizers, (Fall), 77 pages, 1911.
No. 219. Increasing the Winter Yield of Eggs, 92 pages, 1912.
No. 220.* List of Fertilizer Licenses Granted for 1912, 40 pages, 1912.
No. 221.* Preliminary Report of Dairy and Food Commissioner, 46 pages, 1912.
No. 222. Proceedings State Board of Agriculture, 190 pages, 1912.
No. 223. Analyses Commercial Feeding Stuffs for 1911, 172 pages, 1912.
No. 224. Commercial Table Syrups and Molasses, 98 pages, 1912.
No. 225. Report on Linseed Oil, 1911, 32 pages, 1912.
No. 226.* County and Local Agricultural Societies' Fairs 1912, 10 pages, 1912.
No. 227.* List of Licensed Veterinarians in Pennsylvania, 1912, 36 pages, 1912.
No. 228.* Farmers' Institutes in Pennsylvania, Season 1912-1913, 70 pages, 1912.
No. 229. Proceedings Farmers' Annual Normal Institute, and Spring Meeting State Board of Agriculture, 206 pages, 1912.
No. 230. Analyses of Commercial Fertilizers, (Spring), 1912, 98 pages, 1912.
No. 231. Partial List of Owners and Breeders of Registered Livestock in Pennsylvania, with Registration of Stallions for 1910-1911, pages, 1912.
No. 232. Law Bulletin, Dairy and Food Bureau, 1912, 66 pages, 1912.
No. 233. Practical Side of Local Organization in Agriculture, 16 pages, 1912.
No. 234. Analyses Commercial Feeding Stuffs (1912), 227 pages, 1913.
No. 235. Beef Production, 250 pages, 1913.
No. 236. Linseed Oil Report (1912), 11 pages, 1913.
No. 237. List Fertilizers Manufacturers (1913), 40 pages, 1913.
No. 238. Proceedings Annual Meeting State Board of Agriculture, 210 pages, 1913.
No. 239. List County and Local Fairs, 1913, 10 pages, 1913.
No. 240. Supplementary Report, Dairy and Food Commissioner, 56 pages, 1913.
No. 241. Proceedings Farmers' Annual Normal Institute, 302 pages, 1913.
No. 242. Analyses Commercial Fertilizers, 88 pages, 1913.

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No. 243. Schedule Farmers' Institutes for Penna., 76 pages, 1913.
No. 244. Analyses Commercial Fertilizers, Fall, 65 pages, 1913.
No. 245. List of Fertilizer Manufacturers and Importers, for 1914, 40 pages, 1914.
No. 246. Proceedings State Board of Agriculture, 282 pages, 1914.
No. 247. Preliminary Report, Dairy and Food Bureau, 82 pages, 1914.
No. 248. County and Agricultural Fairs, 8 pages, 1914.
No. 249. Commercial Feeding Stuffs, 1913, 190 pages, 1914.
No. 250. Soils of Pennsylvania, Part One, 481 pages, 1914.
No. 251. Law Bulletin, Dairy and Food Bureau, 102 pages, 1914.
No. 252. Abandoned and Unoccupied Farms of Pennsylvania, 48 pages, 1914.
No. 253. Proceedings Farmers' Normal Institute, 190 pages, 1914.
No. 254. Farmers' Institutes of Pennsylvania for 1914, 72 pages, 1914.
No. 255. Analyses of Commercial Fertilizers, Spring, 1914, 94 pages. 1914.
No. 256. Creameries and Cheese Factories of Pennsylvania, 32 pages, 1914.
No. 257. Soils of Pennsylvania, Part Two, 286 pages, 1914.
No. 258. Seed Report, 1913, 36 pages, 1914.
No. 259. Commercial Fertilizers, Fall, 1914, 66 pages, 1914.
No. 260. List Fertilizer Licenses Granted for 1915, 29 pages, 1915.
No. 261. Sour Soils and Liming, 221 pages, 1915.
No. 262. Linseed Oil Report for 1914, 22 pages, 1915.
No. 263. Preliminary Report Dairy and Food Commissioner, 61 pages, 1915.
No. 264. Proceedings State Board of Agriculture, 328 pages, 1915.
No. 265. Analyses Commercial Feeding Stuffs, for 1914, 221 pages, 1915.
No. 266. List of Agricultural Societies and Schedule of Fairs, 9 pages, 1915.
No. 267. Proceedings Annual Normal Institute, 204 pages, 1915.
No. 268. Milk, Butter and Butter Making, 43 pages, 1915.
No. 269. Analyses Commercial Fertilizers, (Spring), 85 pages, 1915.
No. 270. Schedule Farmers' Institutes, 74 pages, 1915.

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FERTILIZER VALUATIONS

The object of an official valuation of commercial fertilizers is to enable the consumer to judge approximately whether he has been asked to pay for a given brand more than the fertilizing ingredients it contains and market conditions pervailing at the time would warrant. It is clear, therefore, that no attempt is made in this valuation to indicate whether the fertilizer valued possesses a greater or less crop-producing capacity than another fertilizer; but only whether it is higer priced than another of the same general composition.

For this purpose the valuation must be so computed as to include all the elements entering into the cost of a fertilizer as it is delivered to the consumer. These elements differ with the conditions of sale. Sales to consumers fall chiefly into two classes: (1) Those made directly from the jobber or manufacturer to the consumer, without the service of a local agent or dealer. Such sales are usually in relatively large lots for cash. (2) Those made through a local agent or dealer. These are most commonly made in relatively small lots and often with arrangements for deferred payments.

In some States, the valuations are so made as to represent sales only of the former class. In Pennsylvania, however, the principal volume of sales is of the second class, and the method of valuation has, therefore, included the additional cost elements involved in this mode of sale. The several cost elements or factors may conveniently be grouped as follows:

1. The wholesale cost of the ingredients.
2. The jobbers' gross profit on the sale of the ingredients; this includes office expenses, advertising, losses, etc.; for the purpose of the present computation it may be assumed that the sum of this gross profit and the wholesale cost of the ingredients, is equivalent to the retail price of the single ingredients near the wholesale markets in ton lots of original packages for cash.
3. The expense and profit of mixing: This item applies only to complete fertilizers, rock and potash, and ammoniated rock; not to dissolved or ground bone, or to dissolved rock.
4. The expense and profit of bagging.
5. Agents' commission: This item includes not only the commission proper, but every advance in price due to the sale of the goods through an agent in small quantities on time, rather than directly to the consumer in ton lots for cash.
6. Freight from the wholesale market to the point of delivery.

The valuations for 1915 are based:

1. Upon the wholesale prices September 1, 1914, to March 1, 1915, of the raw materials used in fertilizer manufacture, the quotations of the New York market being adopted for all materials except acidulated phosphate rock and ground bone.
2. Upon an allowance of 20 per cent. of the wholesale prices, above mentioned, to cover jobbers' gross profit.

By adding the 20 per cent. allowed for jobbers' gross profit to the wholesale price of the several raw materials, the retail price in original packages at the jobbers' warehouse is obtained.

Since the amount of the several valuable fertilizing constituents in the various raw materials is known, it is a simple matter to determine the corresponding retail value per pound of the valuable fertilizing constituents yielded by each raw material. A schedule of these pound values affords a convenient basis of computation of the value per ton of various fertilizers, whose composition is ascertained by analysis.

The values assigned, for the present, to the other elements in the cost of the fertilizer at the point of delivery are:

3. For mixing, $1.00 per ton.

4. For bagging, $1.00 per ton, in all cases except those in which the article was sold in original packages; the cost of the package being, in such case, included in the wholesale price.

5. For agents' commission, 20 per cent. of the cost of the goods f. o. b. at the jobbers' or mixers' warehouse.

6. For freight, $2.00 per ton; the cost of the freight in lots of twelve tons or over, from the seaboard to Harrisburg, averaging $1.88 per ton.

The following valuation of dissolved South Carolina rock illustrates the method:

Phosphoric Acid	%	Weight per ton	
Available,	14.00	280 lbs. at 3c,	$8.40
Insoluble,	1.00	20 lbs. at 1½c,	.30
Retail cash value of ingredients,			8.70
Bagging,			1.00
Cash value of goods ready for shipment,			9.70
Agents' commission, 20 per cent.,			1.94
Freight,			2.00
Commercial value per ton,			$13.64

It is not to be expected, of course, that the valuations thus computed will precisely represent the fair price to be charged for a brand in each locality and in every transaction. Market conditions, competition, distance from factory, all introduce minor variations. Nevertheless, to make the approximation reasonably close the average valuation of a given class of goods ought to agree closely with its ascertained average selling price. Whenever such an agreement is no longer obtained by the use of a schedule, it is evident that the schedule of retail values of the constituents, or the added allowances for mixing, etc., requires revision.

It is needful to note here another factor greatly affecting the practical accuracy of these approximations. Their computation would offer little difficulty and their usefulness be far greater, if, by the ordinary methods of analysis, the exact nature of the ingredients used to supply the several fertilizer constituents, were capable of certain determination. This is, however, possible to-day to only a limited extent. The valuations are therefore based in general on the assumption that the fertilizers are uniformly compounded from high quality ingredients, such as are commonly employed in the manufacture of fertilizers of the several classes. Consumers should carefully avoid the error of accepting such valuations as infallible; they are not designed to be used for close comparisons of single brands, but only to indicate whether the price asked for a fertilizer is abnormal, assuming good quality for the ingredients used. From this it is clear that, *except as high freights may require, the selling price of a brand should not far exceed the valuation; but that a fertilizer may be made of inferior materials and yet have a high valuation.*

The valuations used during 1914 have been modified for use during 1915 in accordance with the changes in wholesale prices of fertilizing ingredients and to make the valuations more closely follow the selling price.

The following comparative statement shows the valuations and selling prices of the several classes of fertilizers during 1910 to 1914.

Fertilizers	Number of samples	Valuation	Selling price	Difference of valuation from selling price.
Spring, 1910				
Complete,	436	26.36	25.26	1.37
Rock-and-potash,	123	16.08	17.16	—1.08
Dissolved bone,	8	21.47	22.17	—.70
Ground bone,	24	30.27	30.19	.08
Dissolved rock,	47	14.00	14.56	—.56
Fall, 1910				
Complete,	294	22.24	21.76	.48
Rock-and-potash,	109	16.34	16.38	—.04
Dissolved bone,	4	25.70	25.80	—.10
Ground bone,	29	31.10	29.98	1.12
Dissolved rock,	32	14.15	14.01	.14
Spring, 1911.				
Complete,	485	25.95	24.97	.98
Rock-and-potash,	129	15.90	17.06	—1.06
Dissolved bone,	6	23.82	20.23	3.49
Ground bone,	23	31.47	30.93	.54
Dissolved rock,	51	14.86	15.83	.97
Fall, 1911				
Complete,	292	22.33	21.73	.60
Rock-and-potash,	129	16.07	16.25	—.18
Dissolved bone,	3	21.51	24.88	—3.37
Ground bone,	25	31.18	31.17	.01
Dissolved rock,	42	13.78	14.00	.22
Spring, 1912				
Complete,	470	27.24	27.64	.40
Rock-and-potash,	137	16.26	18.27	2.01
Dissolved bone,	4	18.92	20.94	2.02
Ground bone,	24	33.26	32.81	.55
Dissolved rock,	43	14.20	14.69	.49
Fall, 1912				
Complete,	238	23.49	22.16	1.33
Rock-and-potash,	124	16.55	15.88	.67
Dissolved bone,	4	25.50	23.80	1.70
Ground bone,	28	34.84	30.55	4.29
Dissolved rock,	42	13.92	13.80	.12

Fertilizers	Number of samples	Valuation	Selling price	Difference of valuation from selling price.
Spring, 1913				
Complete,	531	26.44	25.08	1.26
Rock-and-potash,	140	16.52	16.75	—.23
Dissolved bone,	4	21.63	18.55	3.08
Ground bone,	32	32.50	33.86	—1.36
Dissolved rock,	43	14.25	13.96	.29
Fall, 1913				
Complete,	292	24.36	21.92	2.44
Rock-and-potash,	140	16.85	16.25	.60
Dissolved bone,	6	24.26	24.75	—.49
Ground bone,	36	32.63	31.12	1.51
Dissolved rock,	40	13.70	13.51	.19
Spring, 1914				
Complete,	505	26.93	24.72	2.21
Rock-and-potash,	131	15.60	16.79	—1.19
Dissolved bone,	4	27.28	26.75	1.02
Ground bone,	23	30.15	31.43	—1.28
Dissolved rock,	30	13.71	14.48	—.77
Fall, 1914				
Complete,	281	22.64	20.83	1.81
Rock-and-potash,	99	15.42	15.21	.21
Dissolved bone,	2	19.02	16.05	2.97
Ground bone,	23	33.45	32.20	1.25
Dissolved rock,	38	13.97	13.78	.19

In ammoniates such as dried blood and fish guano, the unit is of ammonia, of which 82.25 per cent is nitrogen; in acid phosphate the unit is of phosphoric acid (phosphorous pentoxid).

There has been a decided rise in the prices of some of the organic ammoniates, and of ammonium sulphate, and a decrease in the cost of nitrogen from nitrate of soda.

Phosphate rock and sulphuric acid show little change in prices compared with last year, but acid phosphate a considerable decrease.

Composition of Raw Materials.—In order to form a correct idea of the cost per pound of the fertilizer constituents of these materials, it is needful to determine their composition or, in other words, the quantities of valuable constituents each contains. The following table shows the composition of raw materials used in the manufacture of fertilizers. Few analyses of these materials, with the exception of ground bone and dissolved rock, have been made in Pennsylvania. The figures in the following table include the averages of the results of analyses made in Connecticut, New Jersey and Massachusetts during the past year, except in the case of ground bone and dissolved rock phosphates, where Pennsylvania results alone are included.

The following statement from the weekly reports of the Oil, Paint and Drug Reporter, of New York City, shows the average wholesale prices of fertilizer ingredients in the market, Sept. 1, 1914, to March 1, 1915:

Substance	Amount Priced	Average price Sept. 1, 1913, to March 1, 1914	Average price Sept. 1, 1914, to March 1, 1915	Prices Sept.-March, 1914-1915 in per cent. of prices of 1913-1914
Sulphate of ammonia,	Cwt.,	2.290	2.748	120.0
Nitrate of Soda,	Cwt.,	2.290	1.937	84.58
Dried Blood, H. G.,	Unit, (20 lbs.),	3.110	3.089	99.32
Concentrated Tankage,	Unit, (20 lbs.),	2.76	2.943	106.63
Rough Bone,	Ton,	29.25	23.25	100.00
Bone Meal,	Ton,	29.25	29.25	100.00
Fish Guano, dry,	Unit, (20 lbs.),	3.31	3.28	99.12
Phosphate Rock, Tenn.,	Ton,	5.25	5.25	100.00
Acid phosphate,	Unit, (20 lbs.),	.525	.475	90.47
Double manure salt,	Ton,	24.97	....	....
Sulphate of potash,	Ton,	47.156	....	....
Kainit,	Ton,	8.425	....	....
Muriate of potash,	Ton,	38.356	....	....
Sulphuric acid, 66°B,	Cwt.,	1.05	1.05	100.00

Composition of on-Acidulated Fertilizer Ingredients, (Per Cent.)

Substance	Number of samples analysed	Nitrogen	Potash	Phosphoric acid
Sulphate of ammonia,	3	20.53	....	....
Nitrate of soda,	33	15.30	....	....
Dried blood,	8	12.14	....	....
Ground bone,	35	2.92	....	24.01
Tankage,	32	5.85	....	11.44
Ground fish,	19	8.44	....	6.69
Cottonseed meal,	224	6.90	....	....
Sulphate of potash,	10	....	49.40	....
Muriate of potash,	38	....	50.49	....
Kainit,	16	....	13.55	....
Double salt of kainit and,	2	....	27.51	....

Composition of Acidulated Fertilizer Ingredients. (Per Cent.)

	Number of samples	Total phosphoric acid	Insoluble phosphoric acid	Nitrogen
Dissolved bone,	6	14.54	3.88	1.88
Dissolved phosphate rock,	68	15.52	1.01	....

Cost per Pound of Fertilizer Constitutents.—With the composition of these raw materials and their price per ton, hundred weight, or other unit of measure as a basis, the wholesale cost per pound of the valuable constituents can readily be calculated. In many cases the ammoniates are quoted "per unit of ammonia," the term unit being equivalent to per cent.; in goods sold by the ton of 2,000 lbs., the unit is equal to 20 lbs., and 20 lbs. of ammonia contain 16.47 lbs. of nitrogen.

In the case of refuse bone-back, unacidulated, the mean, 28.25 per cent. of phosphoric acid, is assumed to represent the average material on the market.

Phosphate rock is sold by the ton of 2,240 lbs., and on the basis of the bone phosphate of lime it contains, with drawbacks for injurious constituents. Bone-phosphate of lime contains 45.8 per cent. of phosphoric acid; therefore, each per cent. of bone phosphate in a long ton is equivalent to 22.4 lbs., and contains 10.26 lbs. of phosphoric acid.

In the wholesale trade, dried blood, azotine, concentrated tankage and hoof meals are usually sold on the basis of ammonia, disregarding the phosporic acid present.

Insoluble phosporic acid in dissolved rock is likewise omitted from consideration, contracts being based solely upon the "available" phosporic acid; nor in rock phosphates is any claim made for the small quantities of nitrogen and potash they contain, nor in dissolved bone for the potash present.

Under these conditions, the wholesale cost per pound in New York of the valuable constituents of such materials as furnish but a single fertilizing element, these materials being assumed to be in the state of preparation and in the packing in which the manufacturing purchased them, are given in the following table; also a figure representing a fair retail price at the factory, the materials having undergone no change in treatment or packing and the allowance for expenses and profit in retailing being 20 per cent.

Wholesale Cost per Pound of Fertilizing Constituents, New York
1. Ingredients Supplying One Constituent

Materials	Constituents Valued	Wholesale price. Cents	Wholesale price plus 20 per cent. Cents
Sulphate of ammonia,	Nitrogen,	13.39	16.07
Nitrate of soda,	Nitrogen,	12.66	14.71
Dried blood,	Nitrogen,	18.84	22.61
Concentrated tankage,	Nitrogen,	17.95	21.54
Phosphate rock, Tenn., 78 per cent.,	Phosphoric acid, (total),*	.66	.79
Acid phosphate,	Phosphoric acid, available,	2.37	2.94

*The prices of phosphate rock are f. o. b. at the respective points of shipment, not New York. The prices for potash are taken from the schedule of the syndicate, and those of the remainder from the Oil, Paint and Drug Reporter.

The quotations for bone are given without specific reference to quality, so that it is impossible, from these data, fairly to apportion their several wholesale values to the nitrogen and phosphoric acid contained in this material. As compared with tankage, the general tendency is to assign a higher commercial rating to the phosphoric acid in bone, and to the nitrogen, a rating not very different from that given in tankage.

In former years, the value assigned to the bone nitrogen has been the same as that quoted on crushed tankage, c. a. f. Baltimore. In later years, quotations for both crushed tankage and ground tankage have not been available, and for that reason, the value of bone nitrogen is based upon the quotations for concentrated tankage.

In earlier years, quotations on ground tankage have been about 5 per cent. in advance of those on concentrated tankage; also quotations on crushed tankage were on an average 12.67 per cent. in advance of those on ground tankage. Increasing the price of concentrated tankage by these percentages, we have $3.46 per unit of ammonia as the value assigned to the nitrogen in bone.

This is equivalent to $4.19 per unit of nitrogen.

The average composition of the ground bone and bone meal samples analyzed last year in Pennsylvania was: Phosphoric acid, 22.35 per cent.; nitrogen 3.24 per cent.

The prepared bone contains less fat and moisture, and often less nitrogen than the ordinary rough bone, but these differences tend, in a measure, to neutralize each other. Assuming for the rough bone quoted in the New York market the same composition as the bone meal sold in Pennsylvania, and for the value of the nitrogen $4.19 per unit, as previously stated, the values per pound of the several constituents would be:

Wholesale Cost per Pound of Fertilizer Constituents, New York
II. Bone

Materials	Constituents Valued	Wholesale price. Cents	Wholesale price, plus 20 per cent.
Rough bone,	Nitrogen,	20.95	25.14
	Phosphoric acid,	3.17	2.60
Ground bone,	Nitrogen,	20.95	25.14
	Phosphoric acid,	3.45	4.14

Valuation in Neighboring States

It is desirable, from all points of view, that the schedules of valuation throughout a district in which similar market conditions prevail, should differ as little as possible. It has been our practice in the past, to conform our schedule to that adopted after very careful co-operative study of the market conditions for each year, by the

New England States, New York and New Jersey, except where the peculiar conditions of our markets have been made the valuations diverge too largely from the actual selling prices, as in the case of ground bone and dissolved rock phosphates. The schedules for these States for 1914 and 1915 are as follows:

Trade Values Adopted by the New England States and New Jersey

	Cents per Pound		Value in 1915 in per cent. of those in 1914
	1914	1915	
Nitrogen:			
In nitrates,	16½	15	90.0
In ammonium salts,	16½	15½	93.9
In dry and fine ground fish and blood,	22½	22	27.7
In fine bone and tankage,	21½	21	97.6
In coarse bone and tankage,	17½	17	97.2
In mixed fertilizers,	19½	19	97.5
Phosphoric acid:			
Water soluble,	4½	4	88.9
Citrate soluble,	4	3½	87.5
In fine ground bone and tankage,	4	4	100.0
In coarse bone and tankage,	3½	3½	100.0
In mixed fertilizers, insoluble,	2	2	100.0
Potash:			
In forms free from muriate,	5	9½	190.0
As muriate,	4	8½	212.5

Valuations in Pennsylvania

For reasons stated on the previous page, the New England schedule has been followed in the case of mixed fertilizers and dissolved bones.

In the case of the dissolved rocks, the wholesale prices of raw materials used in their manufacture and of the available phosphoric acid itself, having shown no material change, the values used in the Pennsylvania schedule for 1914 are continued for use during the present year.

With respect to the potash and nitrate salts, the experience of recent years has shown a growing increase in the proportion of the official samples that represent direct cash purchases in large quantities. The result has been that the commercial valuations, based upon the conditions and costs of sale in small quantities, through local agents and on time, came to be, in a large fraction of the cases represented by these salts whose analyses are reported in the miscellaneous group, strikingly higher than the selling prices quoted. *For this reason, it has appeared needful to proceed, hereafter, upon the assumption that all potash and nitrate salts sold unmixed as such, have been purchased at what are virtually jobbers' prices plus freight, and to adopt corresponding pound values. In the case, however, of potash and nitrogen in mixed fertilizers, the computation will be made as heretofore, upon the assumed basis of sale on time, in small quantities and through local dealers.*

Buyers who are interested in the comparative jobbing prices of other materials, will find the data in the preceding pages.

The entire schedule adopted for use in this State is presented in the following table:

Pennsylvania Schedule of Values for Fertilizer Ingredients, 1915

	Cents Per Pound
Nitrogen:	
In ammonium salts,	15½
In nitrates,	15
In meat, dried blood, etc.,	22
In mixed fertilizers,	19
In fine ground bone and tankage,	17
In coarse bone and tankage,	15
Phosphoric acid:	
Available, in bone fertilizers,	3¾
Available, in rock fertilizers,	2¾
Insoluble in ammonium citrate, in bone fertilizers,	2
Insoluble in ammonium citrate, in rock fertilizers,	1
In fine bone, tankage and fish,	3½
In coarse bone and tankage,	2½
Potash:	
In high grade sulphate of other forms free from muriate,	9½
As muriate,	8½

FERTILIZERS ANALYSES JANUARY 1 TO AUGUST 1, 1915

Since January 1, 1915, there have been received from authorized sampling agents one thousand six hundred fertilizer samples, of which six hundred and ten were subjected to analysis. Preference was given to those which have not been recently analyzed. In cases where two or more samples representing the same brand were received, equal portions from several samples were united, and the composite sample was subjected to analysis.

The samples analyzed group themselves as follows: 422 complete fertilizers, furnishing phosphoric acid, potash and nitorgen; 9 dissolved bones, furnishing phosphoric acid and nitrogen; 86 rock and potash fertilizers, furnishing phosphoric acid and potash; 48 acidulated rock phosphates, furnishing phosphoric acid only; 24 ground bones, furnishing phosphoric acid and nitrogen, and 21 miscellaneous samples, which group includes substances not properly classified under the foregoing heads.

The determinations to which a complete fertilizer is subjected are as follows: (1) Moisture, useful for the comparison of analyses, for indication of dry condition and fitness for drilling, and also of the conditions under which the fertilizer was kept in the warehouse. (2) Phosphoric acid—total and insoluble; the latter is, that portion not soluble in water nor in warm ammonium citrate solution (a solution supposed to represent the action of plant roots upon the fertilizer), which is assumed to have little immediate food value. By difference, it is easy to compute the so-called "available" phosphoric acid. (3)

Potash soluble in water—most of that present in green sand marl and crushed minerals, and even some of that present in vegetable materials such as cotton-seed meal, not being included because insoluble in water even after long boiling. (4) Nitrogen—This element is determined in such manner as to ascertain its *total* quantity and also, the quality of the organic nitrogenous material present in the finished fertilizer. The fertilizer is washed thoroughly with water, which removes the nitrates, ammonium salts and almost all of the cyanamid nitrogen, and the soluble organic nitrogenous materials. These are not separately determined but are grouped under the name *"water-soluble nitrogen."* The quantity of *water-insoluble nitrogen* is directly determined, and by difference between its amount and the total nitrogen, the water-soluble nitrogen is calculated. Another portion of water-soluble material* is treated with alkaline potassium permanganate, which attacks the nitrogenous organic substances present, and converts the more active portion into ammonia, which is distilled off, determined, and its nitrogen calculated as *"active insoluble nitrogen."* The *"inactive insoluble nitrogen"* is then computed by substracting the active insoluble from the total insoluble nitrogen. The term "available nitrogen" as used in this report, is the sum of the water-soluble and the active insoluble nitrogen. It is equivalent to the total niitrogen less the inactive insoluble nitrogen. In high grade organic nitrogenous materials, among which, from its behavior with this treatment, must be included horn meal, the percentage of inactive nitrogen in the insoluble nitrogen is usually under 40 per cent.; and the ratio of inactive to active insoluble nitrogen in such materials is usually less than 60:100. On the other hand, in the case of low-grade nitrogenous materials, the proportions of inactive nitrogen are much higher. The separations effected by these methods are therefore of great value in distinguishing whether the insoluble nitrogen is derived from high grade materials, or from low grade substances such as garbage tankage, peat, mora meal, uncidulted hair, leather, etc. There is, however, one fertilizer ingredient rapidly coming into use, whose presence may lead to erroneous conclusions, if judgment is based solely upon the facts ascertained by the foregoing method, namely, cyanamid. This substance contains from 13 to 16.5 per cent. of nitrogen, of which 12 to 14.7 per cent. is soluble in water, by the mode of treatment used in the alkaline permanganate method; and, of the 1.0 to 1.7 per cent. of water-insoluble nitrogen, less than one-fifth is active; so that the ratio of inactive to insoluble nitrogen is about 80:100. Owing to its tendency to reduce the availability of the phosphoric acid in acid phosphate mixtures, limited quantities only of this ingredient can be used advantageously in mixed fertilizers. Nevertheless, in cases where low grade sources of nitrogen are indicated by the foregoing method, it would be needful to determine, by supplementary tests, whether or not cyanamid may be present to account for an undue proportion of inactive, insoluble nitrogen, before concluding that such excess of inactive nitrogenous material is attributed to low-grade nitrogenous constituents. It is desirable to keep in mind at this point the fact also that certain widely used low-grade nitrogenous substances, such as garbage tankage, peat and mora meal, are not included in the list of substances whose act. (5) Chlorin—this determination is made to afford a basis for estimating the proportion of the potash that is present as chlorid or muriate, the cheaper source. The computation is made on the assumption that the chlorin present, unless in excess, has been introduced in the form of muriate of potash; but doubtless there are occasional exceptions to this rule. One part of chlorin combines with 1.326 parts of potash to form the pure muriate; knowing the chlorin, it is therefore, easy to compute the potash equivalent thereto. (7) In the case of ground bone, the state of sub-division is determined by sifting through accurately made sieves; the cost of preparation and especially the promptness of action of bone in the soil depend very largely on the fineness of its particles, the finer being much more quickly useful to the plant.

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*This determination has been omitted in all cases where the insoluble nitrogen is only 2 per cent. or less.

The legislation of 1909 has made needful some additional tests. Section 4, of the Act of May 1, 1909, prohibits the sale of "pulverized leather, hair, ground hoof, horns, or wool waste, raw, steamed, roasted, or in any form, as a fertilizer, or as an ingredient of a fertilizer or manure, without an explicit statement of the fact." All nitrogenous fertilizers have, therefore, been submitted to a careful microscopic examination, at the time of preparing the sample for analysis, to detect the presence of the tissues characteristic of the several materials above named.

The act of April 23, 1909, makes it unlawful to use the word "bone" in connection with, or as part of the name of any fertilizer, or any brand of the same, unless the phosphoric acid contained in such fertilizer shall be the product of pure animal bone All fertilizers in whose name the word "bone" appears, were therefore examined by microscopic and chemical methods to determine, so far as possible with present knowledge, the nature of the ingredient or ingredients supplying the phosphoric acid. It is a fact, however, well known to fertilizer manufacturers and which should be equally understood by the consumre, that it is, in certain cases, practically impossible to determine the source of the phosphoric acid by an examination of the finished fertilizer. The microscope shows clearly the structure of raw bone, but does not make it possible to discriminate between thoroughly acidulated bone and acidulated rock. The ratio of nitrogen to phosphoric acid in a raw bone—and only such bone as has not been deprived of any considerable proportion of its nitrogenous material by some manufacturing process can properly be called "pure animal bone"—is about 1:8, in cases where the ratio of phosphoric acid to nitrogen exceeds 8, it is clear that part, at least, of the phosphoric acid has been supplied by something else than pure animal bone; but, inasmuch as nitrogen may have been introduced in some material other than bone and no longer detectable by the microscope, the presence of nitrogen and phosphoric acid in the proportions corresponding to those of bone is not proof positive that they have been supplied by bone. Finally, the differences in the iron and silica content of bone and rock respectively, afford means of distinction useful in some cases; the usefulness of this distinction is limited, however, by the facts that kitchen bone frequently contains earthy impurities rich in iron and silica, and that earthy fillers can legally be used in fertilizers and are in fact considerably used therein both as "makeweights" and as "conditioners," or materials introduced to improve the drilling qualities of the goods. The fact that the phosphoric acid in bone and rock are identical in character is probably so well known as to require no detailed consideration in this connection.

The law having required the manufacturer to guarantee the amount of certain valuable ingredients present in any brand he may put upon the market, chemical analysis is employed to verify the guaranties stamped upon the fertilizer sacks. It has, therefore, been deemed desirable in this report to enter the guaranty filed by the manufacturer in the office of the Secretary of Agriculture, in such connection with the analytical results that the two may be compared. An unfortunate practice has grown up among manufacturers of so wording the guaranty that it seems to declare the presence in the goods of an amount of valuable constituent ranging from a certain minimum to a much higher maximum; thus, "Potash, 2 to 4 per cent." is a guaranty not infrequently given. In reality, the sole guaranty is for 2 per cent. The guaranteed amounts given for each brand in the following tables, are copied from the guaranties filed by the maker of the goods with the Secretary of Agriculture, the lowest figure given for any constituent being considered to be the amount guaranteed. For compactness and because no essentially important fact is suppressed thereby, the guaranties for soluble and reverted phosphoric acid have not been given separately, but are combined into a single guaranty for available phosphoric acid; in cases where the maker's guaranty does not specifically mention available phosphoric acid, the sum of the lowest figures given by him for soluble and reverted phosphoric acid is used. The law of 1879 allowed the maker to express his guaranty for nitrogen either in terms of that element or in terms of ammonia equivalent thereto; since ammonia is composed of three parts of hydrogen and fourteen parts of nitrogen, it is a very simple matter to calculate the amount of one, when the amount of the other is given; the amount of nitrogen multiplied by 1.214 will give the corresponding amount of ammonia, and the amount of ammonia multiplied by 0.824 will give the corresponding amount of nitrogen. In these tables, the expression is in terms of nitrogen. The laws of 1901 and 1909 abolished the alternative and required that the quantity shall be given in terms of nitrogen.

Many manufacturers, after complying with the terms of the law, insert additional items in their guaranties, often with the result of misleading or confusing the buyer; the latter will do well to give heed to those items only that are given as the law requires and that are represented in these tables:

Summary of Analyses Made this Season

	Complete fertilizers	Rock and potash	Dissolved bone	Dissolved rock	Ground bone
Number of analyses,	422	86	9	48	24
Moisture, per cent.,	7.89	8.06	5.91	7.99	3.52
Phosphoric acid:					
Total, per cent.,	10.56	12.35	12.35	16.87	21.46
Available, per cent.,	9.05	11.29	9.74	15.84	....
Insoluble, per cent.,	1.51	1.06	2.61	1.03	....
Potash, per cent.,	3.05	2.16	....	....	....
Nitrogen, per cent.,	1.95	....	2.61	....	2.96
Mechanical analyses of bone:					
Fine,	....	....	....	....	53
Coarse,	....	....	....	....	47
Commercial valuation, *	28.45	16.47	24.30	13.97	30.26
Average selling price, *	25.50	16.90	24.69	14.00	33.44

*Dollars per ton.

The average selling prices for the several classes of fertilizers as compared with the corresponding commercial valuations, show several interesting discrepancies between these items. In case of the complete fertilizers, the average selling price is $2.95 lower than the valuation. The valuation was raised chiefly with respect to potash, which had been extensively quoted in January and February of this year at rates corresponding to 8½ to 9½ cents a pound, according to source. For 61 pounds of potash present in the fertilizer, this quotation represents an increase over 1914 values of $2.59. If the potash in complete fertilizers is being sold at 1914 values, the difference between valuation and selling price here noted would be accounted for. In the case of rock and potash brands, such condition does not appear.

In the case of ground bones, the average selling price is $3.18 a ton higher than the valuation. This price movement was not at all indicated by either the New York wholesale prices up to March 1st, 1915, nor by the New England and New Jersey quotations of about that date.

"For the purpose of indicating more specifically to the eye, cases deficient from guaranty, an asterisk has been affixed in the analytical tables where the ingredients has been found less in quantity that the manufacturer guaranteed. Too great emphasis should not be placed upon very slight deficiencies, because very slight imperfections in mixing and slight variation in analysis are practically unavoidable. The asterisk has been used, therefore, only in cases where the deficiencies amount to 0.2 per cent. or more, except where nitrogen has been guaranteed in amounts no higher than 1.0 per cent., in which case an asterisk has been affixed where the deficiency amounts to 0.1 per cent. or more."

The cases of departure of goods from their guaranteed composition observed this season, including only those cases in which it amounted to 2-10 per cent. or more where as follows:

Summary of Instances of Deficiency from Guaranty

	Complete fertilizers	Rock and potash	Dissolved bone	Dissolved rock	Ground bone
Deficient in four constituents,	0	0	0	0	0
Deficient in three constituents,	2	0	0	0	0
Deficient in two constituents,	23	4	0	1	0
Deficient in one constituent,	65	8	3	6	3
Total number of samples in which deficiencies occur,	90	12	3	7	3

The cases of deficiency noted during the past nine seasons in the composition of goods as compared with their guaranties, expressed in percentage of the total number of goods of each class analyzed, are as follows:

Percentage of Deficiency, 1910-1915

	Spring, 1910	Fall, 1910	Spring, 1911	Fall, 1911	Spring, 1912	Spring, 1913	Fall, 1913	Spring, 1914	Fall, 1914	Spring, 1915
Complete fertilizers,	28.9	35.9	45.1	46.9	39.0	32.3	46.0	33.1	27.1	21.3
Dissolved bone,	37.5	25.0	16.6	100.00	50.0	50.0	66.7	50.0	0.0	33.3
Rock and potash,	25.2	37.0	27.1	43.4	33.6	26.4	46.0	26.7	35.8	14.0
Dissolved rock,	4.3	6.3	5.9	11.9	12.5	20.9	22.5	23.3	18.9	14.7
Ground bone,	29.17	27.6	47.8	20.0	29.2	25.0	22.2	47.8	32.8	12.5
All classes except miscellaneous,	26.5	33.5	38.7	46.0	36.0	30.4	35.0	32.0	28.0	19.6

The work of this season shows an unusually excellent conformity of composition to guaranty.

A comparison of the average composition of all samples of complete fertilizers for which guaranties are recorded with the average of the corresponding guaranties, for several seasons past, including those of this season, follows:

Average Composition and Guaranty Compared

	Average composition. Per cent.	Average composition. Per cent.
Spring, 1909		
Phosphoric acid:		
Total,	[illegible]	[illegible]
Available,	8.67	7.66
Potash,	5.07	[illegible]
Nitrogen,	1.67	1.60
Fall, 1909		
Phosphoric acid:		
Total,	10.13	[illegible]
Available,	8.27	8.08
Potash,	3.41	3.12
Nitrogen,	1.33	1.26
Spring, 1910		
Phosphoric acid:		
Total,	9.80	8.80
Available,	8.26	7.62
Potash,	5.20	4.68
Nitrogen,	1.63	1.60
Fall, 1910		
Phosphoric acid:		
Total,	9.72	8.80
Available,	8.26	7.62
Potash,	5.20	4.68
Nitrogen,	1.63	1.60
Spring, 1911		
Phosphoric acid:		
Total,	9.86	8.96
Available,	8.31	7.86
Potash,	4.97	4.65
Nitrogen,	1.53	1.54
Fall, 1911		
Phosphoric acid:		
Total,	9.79	9.09
Available,	8.20	7.27
Potash,	3.63	3.39
Nitrogen,	1.12	1.19
Spring, 1912		
Phosphoric acid:		
Total,	8.51	8.82
Available,	8.09	7.78
Potash,	5.34	5.95
Nitrogen,	1.56	1.78
Fall, 1912		
Phosphoric acid:		
Total,	9.16	9.07
Available,	8.28	7.83
Potash,	4.06	3.77
Nitrogen,	1.28	1.30
Spring, 1913		
Phosphoric acid:		
Total,	9.71	8.92
Available,	8.11	7.87
Potash,	5.41	5.17
Nitrogen,	1.61	1.62
Fall, 1913		
Phosphoric acid:		
Total,	[illegible]	9.09
Available,	[illegible]	7.83
Potash,	4.28	4.27
Nitrogen,	1.47	1.35
Spring, 1914		
Phosphoric acid:		
Total,	[illegible]	8.71
Available,	[illegible]	[illegible]
Potash,	[illegible]	[illegible]
Nitrogen,	1.81	1.69

	Average composition. Per cent.	Average composition. Per cent.
Fall, 1914		
Phosphoric acid:		
Total,	9.84	9.25
Available,	8.41	8.00
Potash,	3.42	2.99
Nitrogen,	1.29	1.27
Spring, 1915		
Phosphoric acid:		
Total,	10.56	9.34
Available,	9.05	8.00
Potash,	3.05	3.12
Nitrogen,	1.95	1.82

MATERIALS USED IN FERTILIZERS.

The sampling agents report no case of declaration under the requirements of Section 4 of the fertilizer law, nor has microscopic examination shown any decisive evidence of the presence in any fertilizer of more than accidental traces of any of the substances specified in that section.

On the other hand the results of the examination of the condition of the nitrogen in the complete fertilizers by the alkaline permanganate method affords much that is suggestive.

To keep the tables down to convenient size, the percentages of active insoluble nitrogen found have been omitted. They can be computed, however, from the figures given, by deducting from the total nitrogen the sum of the soluble and the inactive insoluble nitrogen. The ratio which the active insoluble bears to the inactive insoluble nitrogen being the principal indication the method as here used gives respecting the character of the organic nitrogenous ingredients of the fertilizer, the index letters, 'a', 'b' and 'c' (or equivalent characters) have been affixed to the percentages of inactive insoluble nitrogen, to indicate the ratios between the active and inactive insoluble in the several samples. Cases in which the active constitutes three-fifths or more of the insoluble are marked 'a'; two-fifth to three-fifths, 'b', and less than two-fifths 'c'. The New England Stations use the terms 'good,' 'doubtful' and 'poor' for these respective classes of cases.

Of the 233 samples examined this season, 62 belong to class 'a', 192 to 'b', and 22 to 'c'.

If is needful to keep clearly in mind the meaning of the index 'c' as thus applied. Its presence does not suffice to indicate that the fertilizer contains no readily available nitrogen, but merely that part or all of the insoluble nitrogen is derived from low-grade sources, barring cases in which cyanamid is one of the fertilizer ingredients. These low grade materials may be such as are listed in Section 4 of the law, or others in common use, such as garbage tankage, peat or mora meal; and they may, if of animal origin, have had their nitrogenous material changed almost entirely to an available condition by 'wet mixing,' which has, however, little improving effect upon the nitrogenous constituents of garbage tankage and mora meal, and little more upon those of peat.

The use of such low-grade materials is either to make the fertilizer less likely to become sticky or lumpy, or to supply nitrogen from material that would otherwise be wholly thrown to waste. The use of 'conditioners' for the former purpose is, in itself, desirable rather than objectionable; but becomes obnoxious and unjust when the nitrogen they contain in unavailable form is made the basis of a charge at high rate to the buyer. The use also of low-grade and therefore cheap nitrogen supplies whose nitrogen has, by chemical treatment, been made useful for plant-food, is laudable provided the materials are sold for what they are.

In cases where the inactive insoluble nitrogen forms a large fraction of the total nitrogen, and is marked by the index 'c,' and where also the guaranty does not exceed the available nitrogen by an amount equal to most of the 'inactive,' and the selling price, corrected for freight difference, is not considerably less than that asked for fertilizers of like general composition but supplying nitrogen derived from high-grade goods such as bear the index 'a' or even 'b' there is reason to believe that the buyer is being subjected to unfair treatment.

Section 1 of the Fertilizer Law of 1909 requires that the guaranty for a fertilizer shall state 'the percentage such fertilizer contains of nitrogen in an available form.' It is, however, by no means clear that the term 'available,' as used in the law, means precisely the same thing that is meant by the term when used to designate the sum of water soluble and active insoluble nitrogen, as determined by the present method. For some nitrogenous fertilizer ingredients always regarded as of high grade, such as dried blood, meat tankage, and cottonseed meal, contain a considerable fraction of inactive insoluble nitrogen when examined by this method. Until further notice, therefore, the law will not be construed to require that the amount of nitrogen guaranteed shall not exceed that present in a form that will appear as 'available' by the alkaline permanganate method now in use.

In many of this season's samples, however, the quantity of nitrogen thus available is found equal to the percentage guaranteed. On the average, the 'available' nitrogen found was 1.59 per cent., the total, 1.95 that guaranteed, 1.82 per cent.

FERTILIZERS ANALYSES AUGUST 1 TO DECEMBER 31, 1915.

Since August 1, 1915, there have been received from authorized sampling agents eight hundred and fifty-four fertilizer samples, of which three hundred seventy-one were subjected to analysis. Preference was given to those which have not been recently analyzed. In cases where two or more samples representing the same brand were received, equal portions from several samples were united, and the composite sample was subjected to analysis.

The samples analyzed group themselves as follows: 233 complete fertilizers, furnishing phosphoric acid, potash and nitrogen; 33 dissolved bones, furnishing phosphoric acid and nitrogen; 47 rock-and-potash fertilizers, furnishing phosphoric acid and potash; 39 acidulated rock phosphates, furnishing phosphoric acid only; 19 ground bones, furnishing phosphoric acid and nitrogen, and 7 miscellaneous samples, which group includes substances not properly classified under the foregoing heads.

The determinations to which a complete fertilizer is subjected are as follows: (1) Moisture, useful for the comparison of analyses, for indication of dry condition and fitness for drilling, and also of the conditions under which the fertilizer was kept in the warehouse. (2) Phosphoric acid—total and insoluble; the latter is that portion not soluble in water nor in warm ammonium citrate solution (a solution supposed to represent the action of plant roots upon the fertilizer), which is assumed to have little immediate food value. By difference, it is easy to compute the so-called "available" phosphoric acid. (3) Potash soluble in water—most of that present in green sand marl and crushed minerals, and even some of that present in vegetable materials such as cotton-seed meal, not being included because insoluble in water even after long boiling. (4) Nitrogen—This element is determined in such a manner as to ascertain its *total* quantity and also, the quality of the organic nitrogenous material present in the finished fertilizer. The fertilizer is washed thoroughly with water, which removes the nitrates, ammonium salts and almost all of the cyanamid nitrogen, and the soluble organic nitrogenous materials. These are not separately determined, but are grouped under the name *"water-soluble nitrogen."* The quantity of *water-insoluble nitrogen* is directly determined, and by difference between its amount and the total nitrogen, the water-soluble nitrogen is calculated. Another portion of water-insoluble material* is treated with alkaline potassium permanganate, which attacks the nitrogenous organic substances present, and converts the more active portion into ammonia, which is distilled off, determined and its nitrogen calculated as "*active insoluble nitrogen.*" The "*inactive insoluble nitrogen*" is then computed by subtracting the active insoluble from the total insoluble nitrogen. The term "available nitrogen" as used in this report, is the sum of the water-soluble and the active insoluble nitrogen. It is equivalent to the total nitrogen less the inactive insoluble nitrogen. In high grade organic nitrogenous materials, among which, from its behavior with this treatment, must be included horn meal, the percentage of inactive nitrogen in the insoluble nitrogen is usually under 40 per cent.; and the ratio of inactive to active insoluble nitrogen in such materials is usually less than 60 : 100. On the other hand, in the case of low-grade nitrogenous materials, the proportions of inactive nitrogen are much higher. The separations effected by these methods are therefore of great value in distinguishing whether the insoluble nitrogen is derived from high grade materials, or from low grade substances such as garbage tankage, peat, mora meal, unacidulated hair, leather, etc. There is, however, one fertilizer ingredient rapidly coming into use, whose presence may lead to erroneous conclusion, if judgment is based solely upon the facts ascertained by the foregoing method, namely, cyanamid. This substance contains from 13 to 16.5 per cent. of nitrogen, of which 12 to 14.7 per cent. is soluble in water, by the mode of treatment used in the alkaline permanganate method; and, of the 1.0 to 1.7 per cent. of water-insoluble nitrogen, less than one-fifth is active; so that the ratio of inactive to insoluble nitrogen is about 80 : 100. Owing to its tendency to reduce the availability of the phosphoric acid in acid phosphate mixtures, limited quantities only of this ingredient can be used advantageously in mixed fertilizers. Nevertheless, in cases where low grade sources of nitrogen are indicated by the foregoing method, it would be needful to determine, by supplementary tests, whether or not cyanamid may be present to account for the undue proportion of inactive, insoluble nitrogen, before concluding that such excess of inactive nitrogenous material is attributable to low-grade nitrogenous constituents. It is desirable to keep in mind at this point the fact also that certain widely used low-grade nitrogenous substances, such as garbage, tankage, peat and mora meal, are not included in the list of substances whose presence requires specific declaration under Section 4 of the Fertilizer act. 5) Chlorin—this determination is made to afford a basis for estimating the proportion of the potash that is present as chlorid or muriate, usually the cheaper source. The computation is made on the assumption that the chlorin present, unless in excess, has been introduced in the form of muriate of potash; but doubtless there are occasional exceptions to this rule. One part of chlorin combines with 1.326 parts of potash to form the pure muriate; knowing the chlorin, it is, therefore, easy to compute the potash equivalent thereto. (7) In the case of ground bone, the state of sub-division is determined by sifting through accurately made sieves; the cost of preparation and especially the promptness of action of bone in the soil depend very largely on the fineness of its particles, the finer being much more quickly useful to the plant.

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*This determination has been omitted in all cases where the insoluble nitrogen is only .2 per cent. or less.

The legislation of 1909 has made needful some additional tests. Section 4, of the Act of May 1, 1909, prohibits the sale of "pulverized leather, hair, ground hoof, horns, or wool waste, raw, steamed, roasted, or in any form, as a fertilizer, or as an ingredient of a fertilizer or manure, without an explicit statement of the fact." All nitrogenous fertilizers have, therefore, been submitted to a careful microscopic examination, at the time of preparing the sample for analysis, to detect the presence of the tissues characteristic of the several materials above named. The act of April 23, 1909, makes it unlawful to use the word "bone" in connection with, or as part of the name of any fertilizer, or any brand of the same, unless the phosphoric acid contained in such fertilizer shall be the product of pure animal bone. All fertilizers in whose name the word "bone" appears, were therefore examined by microscopic and chemical methods to determine, so far as possible with present knowledge, the nature of the ingredient or ingredients supplying the phosphoric acid. It is a fact, however, well known to fertilizer manufacturers and which should be equally understood by the consumer, that it is, in certain cases, practically impossible to determine the source of the phosphoric acid by an examination of the finished fertilizer. The microscope shows clearly the structure of raw bone, but does not make it possible to discriminate between thoroughly acidulated bone and acidulated rock. The ratio of nitrogen to phosphoric acid in a raw bone—and only such a bone as has not been deprived of any considerable proportion of its nitrogenous material by some manufacturing process can properly be called "pure animal bone"—is about 1 :8. In cases where the ratio of phosphoric acid to nitrogen exceeds 8, it is clear that part, at least, of the phosphoric acid has been supplied by something else than pure animal bone; but, inasmuch as nitrogen may have been introduced in some material other than bone and no longer detectible by the microscope, the presence of nitrogen and phosphoric acid in the proportions corresponding to those of bone is not proof positive that they have been supplied by bone. Finally, the differences in the iron and silica content of bone and rock respectively, affords means of distinction useful in some cases; the usefulness of this distinction is limited, however, by the facts that kitchen bone frequently contains earthy impurities rich in iron and silica, and that earthy fillers can legally be used in fertilizers and are in fact quite often used therein both as "makeweights" and as "conditioners", or materials introduced to improve the drilling qualities of the goods. The fact that the phosphoric acid in bone and rock are identical in character is probably so well known as to require no detailed consideration in this connection.

The law having required the manufacturer to guarantee the amount of certain valuble ingredients present in any brand he may put upon the market, chemical analysis is employed to verify the guaranties stamped upon the fertilizer sacks. It has, therefore, been deemed desirable in this report to enter the guaranty filed by the manufacturer in the office of the Secretary of Agriculture, in such connection with the analytical results that the two may be compared. An unfortunate practice has grown up among manufacturers of so wording the guaranty that it seems to declare the presence in the goods of an amount of valuable constituent ranging from a certain minimum to a much higher maximum; thus, "Potash, 2 to 4 per cent." is a guaranty not infrequently given. In reality, the sole guaranty is for 2 per cent. The guaranteed amounts given for each brand in the following tables, are copied from the guaranties filed by the maker of the goods with the Secretary of Agriculture, the lowest figure given for any constituent being considered to be the amount guaranteed. For compactness and because no essentially important fact is suppressed thereby, the guaranties for soluble and reverted phosphoric acid have not been given separately, but are combined into a single guaranty for available phosphoric acid; in cases where the maker's guaranty does not specifically mention available phosphoric acid, the sum of the lowest figures given by him for soluble and reverted phosphoric acid is used. The law of 1879 allowed the maker to express his guaranty for nitrogen either in terms of that element or in terms of the ammonia equivalent thereto; since ammonia is composed of three parts of hydrogen and 14 parts of nitrogen, it is a very simple matter to calculate the amount of one, when the amount of the other is given; the amount of nitrogen multiplied by 1.214 will give the corresponding amount of ammonia, and the amount of ammonia multiplied by 0.824 will give the corresponding amount of nitrogen. In these tables, the expression is in terms of nitrogen. The laws of 1901 and 1909 abolished the alternative and required that the quantity shall be given in terms of nitrogen.

Many manufacturers, after complying with the terms of the law, insert additional items in their guaranties, often with the result of misleading or confusing the buyer; the latter will do well to give heed to those items only that are given as the law requires and that are presented in these tables:

The cases of departure of goods from their guaranteed composition observed this season, including only those cases in which an asterisk has been affixed, were as follows:

Summary of Instances of Deficiency from Guaranty.

	Complete fertilizers.	Rock and potash.	Dissolved bone.	Dissolved rock.	Ground bone.
Deficient in four constituents,	0	0	0	0	0
Deficient in three constituents,	1	0	0	0	0
Deficient in two constituents,	14	3	2	1	1
Deficient in one constituent,	53	12	11	3	6
Total number of samples in which deficiencies occur,	68	15	13	4	7

The cases of deficiency noted during the past nine seasons in the composition of goods as compared with their guaranties, expressed in percentage of the total number of goods of each class analyzed, are as follows:

Percentage of Deficiency, 1911-1915.

	Spring, 1911.	Fall, 1911.	Spring, 1912.	Spring, 1913.	Fall, 1913.	Spring, 1914.	Fall, 1914.	Spring, 1915.	Fall, 1915.
Complete fertilizers,	45.1	46.9	39.0	32.3	36.0	33.1	27.1	21.3	29.1
Dissolved bone,	16.6	100.00	50.0	50.0	66.7	50.0	0.0	14.0	31.9
Rock and potash,	27.1	43.4	33.6	26.4	46.0	26.7	35.8	14.0	31.9
Dissolved rock,	5.9	11.9	12.5	20.9	22.5	23.3	18.9	14.7	10.3
Ground bone,	47.8	20.0	29.2	25.0	22.2	47.8	31.8	12.5	36.3
All classes except miscellaneous,	38.7	46.0	36.0	30.4	35.0	32.0	28.0	19.6	29.0

A comparison of the average composition of all samples of complete fertilizers for which guaranties are recorded with the average of the corresponding guaranties, for several seasons past, including those of this season, follows:

Average Composition and Guaranty Compared.

	Average guaranty. Per cent.	Average guaranty. Per cent.
Fall, 1911.		
Phosphoric acid:		
Total,	9.59	9.09
Available,	8.20	7.87
Potash,	3.63	3.39
Nitrogen,	1.12	1.19
Spring, 1912.		
Phosphoric acid:		
Total,	9.51	8.82
Available,	8.09	7.78
Potash,	5.34	5.05
Nitrogen,	1.56	1.58
Fall, 1912.		
Phosphoric acid:		
Total,	9.90	9.07
Available,	8.28	7.83
Potash,	4.06	3.57
Nitrogen,	1.28	1.30
Spring, 1913.		
Phosphoric acid:		
Total,	9.71	8.92
Available,	8.11	7.37
Potash,	5.41	5.17
Nitrogen,	1.61	1.62
Fall, 1913.		
Phosphoric acid:		
Total,	9.86	9.09
Available,	8.06	7.83
Potash,	4.28	4.27
Nitrogen,	1.47	1.35
Spring, 1914.		
Phosphoric acid:		
Total,	9.31	8.71
Available,	8.06	7.65
Potash,	5.67	5.52
Nitrogen,	1.81	1.69
Fall, 1914.		
Phosphoric acid:		
Total,	9.84	9.25
Available,	8.41	8.00
Potash,	3.42	2.99
Nitrogen,	1.29	1.27
Spring, 1915.		
Phosphoric acid:		
Total,	10.56	9.34
Available,	9.05	8.00
Potash,	3.06	3.12
Nitrogen,	1.95	1.82
Fall, 1915.		
Phosphoric acid:		
Total,	10.41	9.21
Available,	9.11	7.89
Potash,	1.94	1.88
Nitrogen,	1.25	1.15

A summary of the analyses made this season may be presented as follows:

Summary of Analyses Made This Season.

	Complete fertilizers.	Rock and potash.	Dissolved bone.	Dissolved rock.	Ground bone.
Number of analyses,	238	48	32	39	21
Moisture, per cent.,	....	....	....	....	....
Phosphoric acid:					
Total, per cent.,	10.41	12.07	12.35	16.02	23.03
Available,	9.11	11.08	10.32	15.13	....
Insoluble,	1.30	.99	3.03	.89	....
Potash,	1.94	1.87	....	....	....
Nitrogen,	1.28	....	1.36	....	3.13
Mechanical Analyses of Bone:					
Fine,	....	....	....	....	52
Coarse,	....	....	....	....	48
Commercial valuation,	23.13	15.75	18.32	13.41	33.56
Average selling price,	21.79	16.89	21.52	13.83	32.79

The potash stringency due to the European war, has resulted in a further decrease in the amounts of potash salts used in mixed fertilizers.

The average potash percentages, commerical valuations and selling prices, for the brands analyzed in the Fall Season, of 1913, 1914 and 1915, are as follows:

	1913.		1914.		1915.	
	Complete.	Rock and potash.	Complete.	Rock and potash.	Complete.	Rock and potash.
Potash, per cent.,	4.28	4.70	3.42	3.50	1.94	1.87
Commercial valuations,	$24.36	$16.85	$22.64	$15.42	$23.13	$15.75
Average selling price,	$21.52	$16.25	$20.83	$15.21	$21.79	$16.89

There is a steady decrease in the brands on the market in which potash continues to be as part of the mixture. There is, however, no great increase in the prices asked for the potash used.

The remarkable increase in the number of brands appearing under the heading "Dissolved Bone" is doubtless due to the present potash scarcity. It will appear, upon an examination of the brand names of this group, that many of these fertiliers are not sold as "dissolved bone" strictly. The grouping has been temporarily enlarged to include all fertilizers, not containing potash, that furnish available phosphoric acid and nitrogen.

It is of interest to note how closely the series of valuations based upon the wholesale price of raw materials in the principal markets during the most important buying season and upon certain average allowances for expenses and profits on the part of the mixer and jobber, coincides with the retail prices later ascertained. A comparison for several seasons past is given below:

Comparison of Selling Price and Valuation, 1911-1915.

	Selling price.	Valuation.	Excess of valuation over selling price.
Complete fertilizers:			
1911, Spring,	24.97	25.95	.98
Fall,	21.73	22.33	.61
1912, Spring,	27.64	27.24	—.40
1913, Spring,	25.08	26.44	1.36
Fall,	21.92	24.36	2.44
1914, Spring,	24.72	26.93	2.21
Fall,	20.83	22.64	1.81
1915, Spring,	25.50	28.45	2.95
Fall,	21.79	23.13	1.34
Dissolved bone:			
1911, Spring,	20.83	23.82	3.49
Fall,	24.88	21.51	—3.37
1912, Spring,	20.94	18.92	2.82
1913, Spring,	18.55	21.63	3.08
Fall,	24.75	24.26	—.49
1914, Spring,	26.25	27.28	1.03
Fall,	16.05	19.02	2.97
1915, Spring,	24.69	24.30	—.30
Fall,	21.52	18.32	—3.20
Rock and potash:			
1911, Spring,	17.06	15.99	—1.06
Fall,	16.25	16.07	—.18
1912, Spring,	18.17	16.26	—1.91
1913, Spring,	16.75	16.52	—.23
Fall,	16.25	16.85	.60
1914, Spring,	16.79	15.60	—1.19
Fall,	15.21	15.42	.21
1915, Spring,	16.90	16.47	—.43
Fall,	16.89	15.75	—1.14
Dissolved rock:			
1911, Spring,	15.83	14.26	—1.58
Fall,	14.00	13.78	.22
1912, Spring,	14.69	14.20	—.49
Fall,	13.51	13.70	.19
1914, Spring,	14.48	13.71	—.77
Fall,	13.78	13.97	.19
1915, Spring,	14.00	13.97	—.03
Fall,	13.83	13.41	—.42
Ground bone:			
1911, Spring,	30.93	31.47	.54
Fall,	31.17	31.18	.01
1912, Spring,	32.81	33.26	.45
1913, Spring,	33.86	32.50	—1.36
Fall,	31.11	32.63	1.52
1914, Spring,	31.43	30.15	—1.28
Fall,	32.20	33.45	1.25
1915, Spring,	33.41	30.23	—3.18
Fall,	32.79	33.56	.77

APPENDIX TO REPORT OF STATE VETERINARIAN

THE LIVESTOCK LAW.

The Pennsylvania Act of Assembly approved July 22, 1913, P. L. 928, is generally recognized by persons interested in livestock sanitation as containing the most advanced measures and precautions pertaining to this subject: It has served as a model for legislation in several other states; in fact has been adopted with practically no changes, and has proved satisfactory to all persons who are broad minded and genuinely interested in livestock conservation and public health. The various provisions of this law give the designated officials broad powers to suppress dangerous diseases whether the disease appears only in isolated cases or as an epizootic; but there is nothing in the Act which can reasonably be construed as unduly burdensome to owners and reputable dealers in livestock.

From earliest memory the horse dealer and cattle dealer has been looked upon as a suspicious person. Many dealers take great pride in their ability to cover up defects and diseases in sale stock so as not to be detected by the average buyer at the time of purchase. Until recently there was no adequate law to curb such questionable practices and transmissible diseases have been largely spread through the sale and resale of animals infected with a dangerous disease which was more real than apparent. The present livestock laws, if properly enforced, will prevent this illicit traffic in diseased animals and protect healthy stock from exposure to infection. Any new law which changes an unmoral practice to a criminal offense becomes burdensome to the person whose profits are affected and is therefore regarded as unconstitutional because it interferes with his right to do business according to previous custom.

One of the early prosecutions brought under the Act of July 22, 1913, raised the question of conflict with the State Constitution. The defendant, a cattle dealer, was charged with having sold and transported over the public highway, a cow which was known to be affected with tuberculosis. Defendant's counsel filed a demurrer to the indictment alleging that the Act under which the indictment was drawn is unconstitutional in several particulars and was sustained by the Trial Court. The case was removed to the Superior Court where the constitutionality of the Act was upheld and was the occasion of a most interesting opinion from the Honorable Judge Orlady. The construction put upon the Act is very broad indeed and clears up several points, which may have been in dispute, affecting other branches of the State Government.

The adjudication as handed down by the Superior Court is as follows:

IN THE SUPERIOR COURT OF PENNSYLVANIA

COMMONWEALTH vs. CHARLES FALK. } No. 89 October Term, 1914. Appeal by the Commonwealth from the judgment of the Court of Quarter Sessions of Lancaster County.

Filed Feb. 24, 1915.
ORLADY, J.

For the reasons given in Commonwealth v. Falk, No. 90 October Term, 1914, the judgment in this case is reversed and the record remitted to the court below with a procedendo.

IN THE SUPERIOR COURT OF PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA vs. CHARLES FALK. } No. 90, October Term, 1914. Appeal by the Commonwealth from the judgment of the Court of Quarter Sessions of Lancaster County.

Filed Feb. 24, 1915.
Orlady, J.

The indictment in this case charges a violation of law, viz: "It shall be unlawful for any person to drive or move or transport on or across or along any public highway, or in wagons or in railroad cars or others vehicles, any animal affected with any disease enumerated in section nine of this act, or with any disease now or hereafter adjudged and proclaimed by the State Livestock Sanitary Board be of a transmissible character, except upon permission in writing from the State Livestock Sanitary Board, or any member, officer, or agent, of the Board." The defendant filed a demurrer alleging that no indictable offense was set out; that the act under which the indictment was drawn is unconstitutional, as it violates sec. 3, of art. 3, of the constitution of the Commonwealth of Pennsylvania, in having more than one subject; that it is unconstitutional as it confers legislative powers upon the State Livestock Sanitary Board; that it failed to set forth that the animal suffering with tuberculosis was a domestic animal, or was one of the animals defined in sec. 1 of the act, which was sustained by the Court.

The construction placed upon this statute of July 22, 1913, P. L. 929, is entirely too narrow and refined to meet the substantial and vital demands of this important legislation. The act in question is the last declaration of the legislative will starting in 1897, and it has been enlarged in nearly every succeeding session of the assembly, so that the act of 1913 stands as a codification of all previous legislation relating to the subjects embraced in its title, which is as follows: "An Act relating to domestic animals; defining domestic animals so as to include poultry; providing methods of improving the quality thereof, and of preventing, controlling, and eradicating diseases thereof; imposing certain duties upon practitioners of veterinary medicine in Pennsylvania; regulating the manufacture and sale of tuberculin, mallein and other biological products for use with domestic animals; defining the powers and duties of the State

Livestock Sanitary Board, and the officers and employees thereof; fixing the compensation of the Deputy State Veterinarian; and providing penalties for the violation of the Act." It cannot be open to controversy that but one purpose is sought by this enactment, which is intended to embrace the whole subject-matter, and a fair examination of the body of the act, as suggested by the comprehensive title, would lead any inquiring mind to an examination of its contents.

The restricted definition of "domestic animal" was enlarged so as to embrace any equine or bovine animal, sheep, goat, pig, dog, cat, or poultry. Every provision in the statute reasonably and directly related to the general subject-matter of the legislation, and each provision was considered necessary to carry into effect the beneficent purposes of the enactment. The method adopted by the legislature of enforcing the general provisions of the act was clearly within its power, and in defining the authority and duties of the State Livestock Sanitary Board, and the officers and employes thereof, are so necessarily related to the preventing, controlling, and eradicating the diseases against which the enactment is directed, that each is germane to the general subject. The powers and duties devolved upon the State Livestock Sanitary Board and its officers, are but an enumeration of methods referred to in sec. 6, and are clearly within the power therein defined. Such legislation would be of no effect unless the power to enforce its provisions was lodged somewhere. This Board was deemed the most efficient agency for preventing, controlling and eradicating disease, and enforcing the prescribed penalties for violation of the act. And every power given to the Board was deemed to be directly and immediately necessary to accomplish the expressed objects of the statute. With this authority vested in the Board, the compensation of its employees and all other expenses follow as a reasonable provision, and all are germane to the one object which relates to domestic animals and providing methods of improving the quality thereof. It has been repeatedly stated that our only duty and our only power in scrutinizing an act with reference to its constitutionality is, to discover what, if any, provision of the constitution it violates. The presumption is always in favor of the constitutionality of an act of assembly, and it cannot be declared void unless it violates the constitution clearly, palpably, plainly, and in such manner as to leave no doubt and hesitation: Commonwealth v. Moir, 199 Pa. 543. The interpretation of a statute should be determined by its paramount purpose, rather than by the details through which that purpose is to be accomplished. The subject may have but one object, while the measure necessary for the attainment of that object may necessarily embrace many subordinate subjects, differing in their nature and particular effect, yet all contributing to it, and comprising within the principal subject everything which the nature of the subject of a title reasonably suggests as necessary or appropriate for the accomplishment of its expressed purpose, is sufficiently indicated by such title: Commonwealth v. Jones, 4 Pa. Superior Ct. 362; Commonwealth v. Pflaum, 50 Pa. Superior Ct. 55.

The several provisions of the Act have a proper relation to each other and all the details constitute essential parts of the general design to accomplish a single purpose, and each relates to the same subject which is the common subject of the enactment. The Legislature cannot delegate its power to make a law; but it can make a law to delegate a power to determine some fact or state of things upon which the law makes, or intends to make its own action depend: McGonnell's License, 209 Pa. 327; Foster Township Road Tax, 32 Pa. Superior Ct. 51. As was said in Locke's Appeal, 72 Pa. 491, "There are many things upon which wise and useful legislation must depend, which cannot be known to the law-making power, and must, therefore, be a subject of inquiry and determination outside of halls of legislation." See also C., M. St. Paul R. R. v. Minn., 134 U. S. 143; Elwell v. Comstock, 100 Minnesota, 261; Railroad v. Railroad, 206 U. S. 314; Saratoga v. Gas Co., 191 N. Y. 125, and the recent Minnesota Rate Case, 230 U. S. 380.

The list of dangerous diseases enumerated in the Act, rendered it vitally important to provide that the inspection and care of affected animals and the disposition of carcasses of such, should be under the control of experienced persons, both for the treatment of such and the prevention of epidemic, and for preservation of the records, which result could only be secured by organized bodies of men, who were specially trained in that department of learning.

The act is intended to regulate the transportation of any animal, wild or domestic, having a transmissible disease. The purpose is avowedly to prevent, control and eradicate diseases of domestic animals. But it is just as proper to regulate the transportation of elk, deer or foxes when they may be the means of spreading infectious diseases among domestic animals as it is to prescribe the manner of transporting of the well-known barn or herd stock. The act is framed in clear, unambigious words and it is meant to apply to all animals under the control of man.

The defendant did not ask for a bill of particulars, and could not be misled by any of the provisions of the Act which are fully indicated by the title. Even if the Act of July 22, 1913, is at all doubtful, as to its constitutionality, which is not admitted, the indictment was good under the Act of March 30, 1905, P. L. 78, which is in substance the same as Section 26 of the Act before us, and is still in force. It made no difference under what particular section of a statute the indictment may have been drawn, nor are the infirmities of such section of the indictment thereunder material, provided the indictment be good under some other section of a statute which is valid: 22 Cyc. p. 3, Sec. 8. See also State v. Vandenberg, 159 Missouri, 230; 60 S. W. Repr. 79.

The judgment is reversed, the record to be remitted to the court below with a *procedendo*.

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